Fishery Data Series No. 00-17

Harvest Estimates for Selected Marine Sport Fisheries in Southeast Alaska During 1999

by

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September 2000

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

FISHERY DATA SERIES NO. 00-17

HARVEST ESTIMATES FOR SELECTED MARINE SPORT FISHERIES IN SOUTHEAST ALASKA DURING 1999

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ABSTRACT

Creel surveys of the Juneau, Ketchikan, and Sitka marine sport fisheries for chinook salmon *Oncorhynchus tshawytscha* were conducted during 1999. Estimates from these surveys were necessary to provide data for inseason management of the chinook salmon sport fishery in Southeast Alaska to meet an allocation determined by the Alaska Board of Fisheries. The estimated harvest of chinook salmon was 31,768 in the combined Ketchikan, Sitka, and Juneau boat sport fisheries. Harvests of chinook salmon were near the long-term average (1984, and 1986-98) in the Ketchikan fishery, below average (1983-98) in the Juneau fishery, and 163% of the long-term average (1987-88 and 1992-98) in the Sitka fishery. Hatcheries in Alaska produced 23% of the total chinook salmon harvest while hatcheries in British Columbia, Washington, and Oregon produced about 20% of the harvest. Alaska hatcheries produced 48% of the chinook salmon harvest in Ketchikan, 39% in Juneau, and 12% in Sitka. Non-Alaskan hatcheries accounted for 28% of the chinook salmon harvest in Sitka and 8% of the harvest in Ketchikan, but less than 1% in Juneau. Coded wire tag sampling in Petersburg, Wrangell, and Craig/Klawock fisheries revealed that chinook salmon from Alaska hatcheries contributed about 32%, 14% and 3% of the harvest, respectively.

An estimated 121,080 coho salmon *Oncorhynchus kisutch*, 32,979 pink salmon *Oncorhynchus gorbuscha*, 41,197 Pacific halibut *Hippoglossus stenolepis*, and 17,750 rockfish *Sebastes* species, were also harvested in the combined Ketchikan, Juneau, and Sitka marine boat fisheries. Hatcheries produced 33%, 20% and 27% of the coho salmon harvest in Ketchikan, Juneau, and Sitka, respectively. The Pacific halibut harvest of 8,104 in Juneau was only 72% of the long-term average, the Ketchikan harvest of 5,126 was only 50% of average, but the Sitka harvest of 27,967 was the highest recorded and 209% of the long-term average. Shellfish effort was above average in the Juneau fishery and average in the Ketchikan fishery. Dungeness crab *Cancer magister* harvest was well below average in both Juneau and Ketchikan.

Key words: Creel survey, angler effort and harvest, harvest per unit effort, age composition, length-at-age estimation, round weight, boat sport fishery, hatchery, enhancement, coded wire tag, chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, salmon, *Oncorhynchus*, Pacific halibut, *Hippoglossus stenolepis*, Dolly Varden, *Salvelinus malma*, lingcod, *Ophiodon elongatus,* rockfish, *Sebastes*, Dungeness crab, *Cancer magister*, Tanner crab, *Chionoecetes* species, king crab, *Paralithodes* species, shrimp, *Pandalus* species, Juneau, Ketchikan, Sitka, Petersburg, Wrangell, Craig, Southeast Alaska.

INTRODUCTION

The waters of Southeast Alaska support commercial, sport, personal use, and subsistence fisheries for a variety of salmonid, bottomfish, and shellfish species. In terms of effort, the largest sport fishery in Southeast Alaska is the Juneau marine boat fishery, but other important marine boat sport fisheries occur around Ketchikan, Sitka, Petersburg, Wrangell, Craig/ Klawock, Yakutat, and Haines (Figure 1).

Data on sport harvests of important fish species in Southeast Alaska have been collected both by mail surveys and by various onsite creel surveys. The Statewide Harvest Survey (SWHS) is a mail survey which has provided annual estimates of sport effort and harvest by area since 1977 (Howe et al. 1999). This statewide survey has been an economical means of comprehensively monitoring often remote sport fisheries, and estimates generated are used for official regional and statewide sport harvest numbers. The SWHS estimates, however, cannot be used directly for inseason management because estimates for a given year are not available until the following summer.

Estimates from onsite creel surveys can be used for inseason management and can also be used to gather a variety of other biological and fishery performance data. Creel surveys, however, are relatively expensive and usually less comprehensive than the SWHS. For instance, it is virtually impossible to survey all access points into the sport fishery for chinook salmon *Oncorhynchus tshawytscha* in Southeast Alaska, which remains open year-round in nearly all

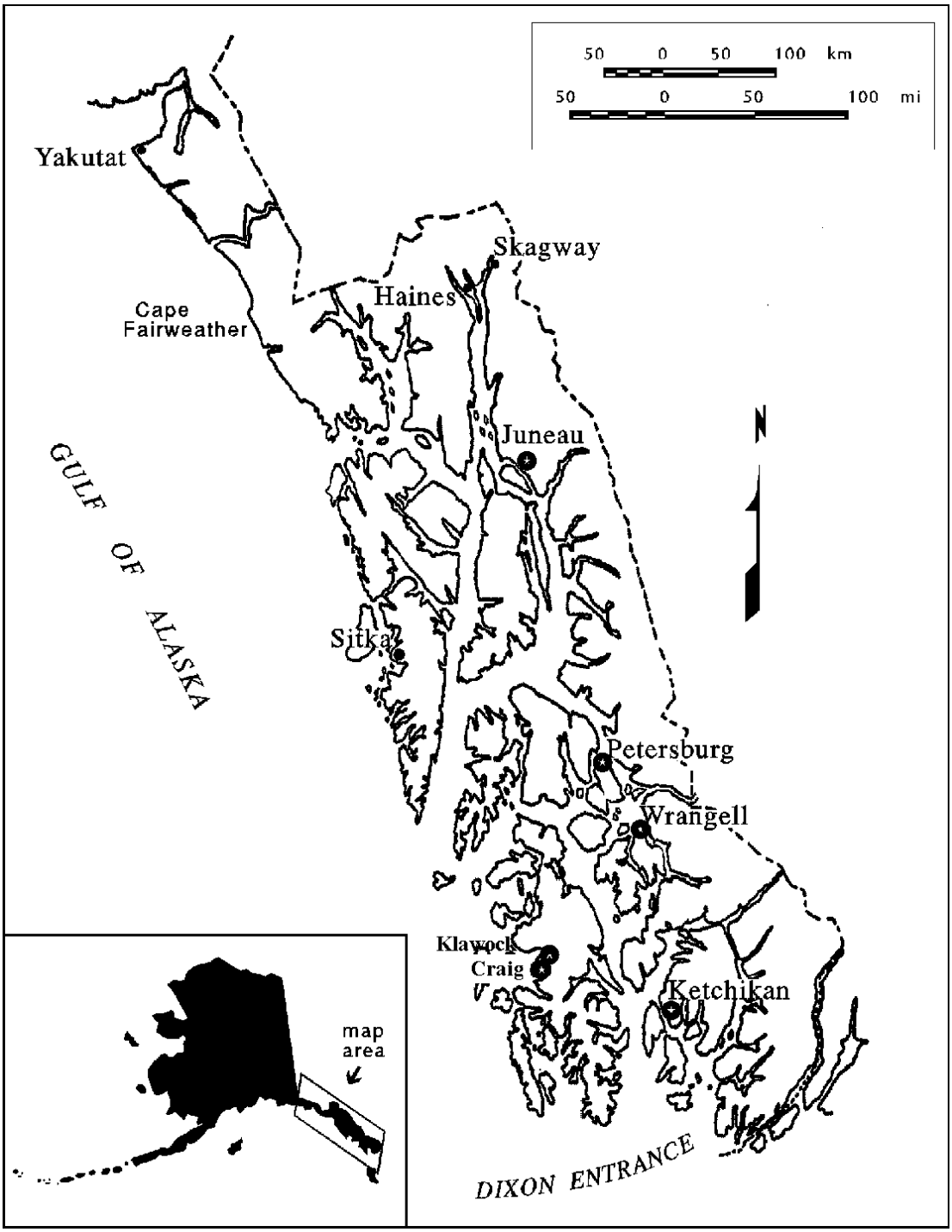


Figure 1.–Location of Juneau, Sitka, Petersburg, Wrangell, Ketchikan, Craig, and Klawock in Southeast Alaska.

marine waters. In fisheries where comparisons of harvest estimates from the SWHS and onsite creel surveys are possible, the two surveys have shown very similar results (Mills and Howe 1992).

Expansion of the onsite creel survey program in Southeast Alaska was necessary beginning in 1992 to monitor sport harvests of chinook salmon on an inseason basis. The Alaska Board of

Fisheries allocated the Pacific Salmon Treaty catch quota for chinook salmon in Southeast Alaska between the sport and commercial fisheries in March of 1992. They also passed a chinook salmon management plan for the sport fishery in Southeast Alaska, which required inseason monitoring of the sport fishery to ensure the allocation was not exceeded.

In order to monitor the entire Southeast Alaska chinook salmon fishery with adequate precision to ensure compliance with the sport fishery allocation, it was determined that creel surveys or catch sample programs were needed in the Ketchikan, Craig, Petersburg, Wrangell, Sitka, and Juneau boat fisheries during the major portion of the fishery for chinook salmon. In 1998, 92% of the total sport harvest of chinook salmon of Southeast Alaska occurred in the SWHS areas represented by these fisheries (Howe et al. 1999). Sport harvests in other SWHS areas (Haines/ Skagway, Glacier Bay, and Yakutat) were determined to be too small or too dispersed to be effectively monitored with onsite programs.

In addition to total harvest estimates for the sport fishery, estimates of the number of Alaska hatchery chinook salmon taken were also necessary since most of this harvest does not count toward the sport fishery allocation. Sampling of sport-harvested chinook salmon for coded wire tags by creel samplers was necessary to provide this information, as a portion of all hatchery releases of chinook salmon in Southeast Alaska are coded wire tagged. Several terminal sport fisheries for Alaska hatchery fish in the Petersburg and Juneau areas were not monitored with creel surveys, as these harvests do not count toward the sport allocation, and post-season estimates from the SWHS will be adequate to document harvests within these fisheries.

Inseason estimates of the harvest of chinook salmon for all of Southeast Alaska were obtained by combining information from past SWHS and onsite creel surveys. This report, however, will only present information from the onsite creel surveys conducted in 1999, because current estimates of total harvests will be revised when final SWHS estimates are completed.

Creel survey information from the marine boat sport fisheries is used for a variety of other management and reporting purposes. Coho salmon *Oncorhynchus kisutch* harvests by the boat sport fisheries are also of special interest, as coho salmon management has become another high priority within the region. Harvest per unit effort (HPUE) data for coho salmon in marine boat recreational fisheries, along with HPUE data from commercial troll and net fisheries, are used to monitor the relative abundance and migratory patterns of coho salmon (see Shaul 1998). Analyses of coded wire tag (CWT) data from coho salmon harvested in these sport fisheries are used for determinations of stock composition (e.g. McPherson et al. 1998).

Creel survey statistics and estimated average weights of sport caught Pacific halibut *Hippoglossus stenolepis* in Southeast Alaska are reported to the International Pacific Halibut Commission (IPHC) on an annual basis as in Jaenicke and Frenette (*Unpublished*). This information has also been provided to the North Pacific Fisheries Management Council during their consideration of proposed Guideline Harvest Levels (GHLs) for sport charter fisheries.

The personal use or sport harvest of shellfish is a very important activity, both for residents of Southeast Alaska and for visitors to the region. Shellfish harvest information is gathered so that the Alaska Department of Fish and Game (ADF&G), in conjunction with the Alaska Board of Fisheries, will have the information necessary to effectively manage these fisheries. Data on the personal use and sport harvest of shellfish in Southeast Alaska have been gathered from onsite creel surveys since 1988.

This report presents the findings of creel surveys of marine boat sport fisheries conducted in 1999 by the Division of Sport Fish of ADF&G in the Ketchikan, Juneau, and Sitka areas. Also covered are the results from CWT sampling programs conducted at Petersburg, Wrangell, and Craig. In 1999, additional CWT sampling in the nearby town of Klawock was used to supplement our Craig sampling program. Results from creel surveys in the Haines area and other sport fisheries in Southeast Alaska are presented in other ADF&G Fishery Data Series reports (e.g., Frenette 1999, Ericksen 1999).

REGULATIONS

Beginning 24 April, filleting, mutilating, or heading sport caught chinook or coho salmon was prohibited by emergency order (E.O.) at ports sampled by the creel program until marine sport boats reached the dock (E.O. #1-4-99). This regulation was enacted to increase the number of salmon which could be sampled for CWTs.

The bag and possession limit for chinook salmon in marine waters was two ≥28″ (″ = inches in length) until harvests were greater than expected, and the bag limit was reduced to one chinook salmon ≥28″ (E.O. #1-19-99) from 3 July through 31 December 1999. There was an annual limit of 4 chinook salmon for non-residents, and charter vessel operators and crew members were prohibited from retaining chinook salmon while clients were on board.

The following marine terminal areas (i.e., areas near hatcheries or hatchery release sites) were regulated by emergency orders to harvest surplus hatchery-produced chinook salmon in 1999:

- E.O.#1-7-99 increased the chinook salmon bag and possession limit to three ≥28″ and six <28″ in Wrangell Narrows terminal area near Petersburg from 1 June through 31 July.
- E.O.#1-8-99 increased the chinook salmon bag and possession limit to two ≥28″ and two <28″ in terminal areas near Juneau from 29 May through 31 August.
- E.O.#1-9-99 and E.O.#1-10-99 increased the chinook salmon bag and possession limit to two ≥28″ and two <28″ in terminal areas near Skagway from 11 June through 31 August.
- E.O.#1-14-99 increased chinook salmon bag and possession limits to four ≥28″ and four <28″ in two terminal areas near Ketchikan from 1 July through 1 August.
- E.O.#1-15-98 increased chinook salmon bag and possession limits to two ≥28″ and two <28″ for the Medvejie and Hidden Falls terminal areas near Sitka from 19 June through 31 July.

Bag limits for salmon species other than chinook salmon were six fish per day, 12 in possession, for fish 16″ or more in length, except that in the Ketchikan and Craig areas the bag limit for pink salmon was increased to 12 per day, 24 in possession from 26 July through October 31 (E.O. 1-24-99).

The Pacific halibut bag limit was two fish per day, four in possession. The bag and possession limit for lingcod *Ophiodon elongatus* was two per day, four in possession during the open season from 1 May through 30 November. The lingcod bag limit for nonresidents in Sitka Sound was 1 per day, 2 in possession. Anglers were limited to five pelagic rockfish *Sebastes* species per day, 10 in possession, and five non-pelagic rockfish, 10 in possession. Only two of the non-pelagic rockfish per day (four in possession) could be yelloweye rockfish *S. ruberrimus*. Areas adjacent to Ketchikan and Sitka were further restricted to a non-pelagic rockfish bag and possession limit of three fish per day, only one of which could be a yelloweye rockfish.

Sport, personal use, and subsistence regulations for the harvest of crab in Southeast Alaska have been summarized by Suchanek and Bingham (1989, 1990). A bag and possession limit of 6 male king crab *Paralithodes* was in effect with local exceptions of 2 males in the Yakutat area and in the commercial fishery subdistrict 11-A near Juneau and 3 males in subdistricts 12-B and 15-C also near Juneau. Also a harvest permit was required for subdistrict 11-A near Juneau which included a seasonal limit of 10 king crab per individual and 20 per household.

OBJECTIVES

The primary goals of the Southeast Alaska marine boat sport fishery surveys in 1999 were to obtain: (1) inseason estimates of the regionwide harvest of chinook salmon; (2) estimates of the regionwide harvest of chinook salmon of Alaska hatchery origin; and (3) estimates of the harvest of coho salmon of Alaska hatchery origin in the Ketchikan, Sitka, and Juneau fisheries. To help measure program performance and achieve project goals, the following objectives were identified:

1. estimate total sport harvest of chinook salmon landed in the Ketchikan, Sitka, and Juneau marine boat sport fisheries from 26 April to 26 September 1999, such that each individual estimate for the surveyed period was within ±20% of the true value 90% of the time;
2. estimate the contribution of Alaska hatchery chinook salmon by coded wire tag lot to each fishery noted above, such that the estimated contribution in relative terms[1] for each individual fishery was within ±25 percentage points of the true value 90% of the time;
3. estimate the percentages of Alaska hatchery chinook salmon by coded wire tag lot to the following marine boat sport fisheries during the noted time periods:
   - Wrangell from 26 April to 4 July
   - Petersburg from 3 May to 11 July
   - Craig/Klawock from 26 April to 12 September

   such that the total relative contribution estimate was within ±25 percentage points of the true value 90% of the time;
4. estimate the contribution of Alaska hatchery coho salmon by coded wire tag lot to the Ketchikan, Sitka, and Juneau fisheries, such that the contribution estimate in relative terms for each individual fishery was within ±25 percentage points of the true value 90% of the time;
5. estimate the percentage of Alaska hatchery coho salmon by coded wire tag lot to the Craig/Klawock fishery, such that the total relative contribution estimate was within ±25 percentage points of the true value 90% of the time; and
6. estimate the average net weight[2] of Pacific halibut harvested in the Juneau, Sitka, Ketchikan, Petersburg/Wrangell, and Craig/Klawock marine boat sport fisheries during the periods surveyed such that the estimates within each sampled angler group (charter and non-charter) for each of the sampled ports were within ±10% of the true value 90% of the time.

[1] Contribution in relative terms equals the contribution estimate divided by total harvest.

[2] Net weight is the weight of a halibut less head, slime, ice, and entrails.

TASKS

In addition to meeting the primary objectives for monitoring the chinook and coho salmon fisheries (discussed above), there were a number of tasks that addressed secondary data needs. To fulfill these data needs, additional tasks in 1999 were:

1. estimate biweekly harvest per unit effort (HPUE) for coho salmon in the Juneau, Sitka, and Ketchikan marine boat sport fisheries during the periods surveyed;
2. estimate total sport angler effort, harvest and catch of coho salmon, pink salmon *O. gorbuscha*, chum salmon *O. keta*, sockeye salmon *O. nerka*, Pacific halibut, lingcod, rockfish, and Dolly Varden *Salvelinus malma* by the Juneau, Ketchikan, and Sitka marine boat sport fisheries during the periods surveyed;
3. estimate personal use effort and harvest of Dungeness crab *Cancer magister*, Tanner crab *Chionoecetes* spp., and king crab in the Juneau and Ketchikan marine boat sport fisheries during the periods surveyed, and of shrimp landed by the Ketchikan marine boat fishery; and
4. estimate the age composition and mean length-at-age of chinook salmon harvested in the Juneau and Ketchikan marine boat sport fisheries during the periods surveyed.

METHODS

Procedures for obtaining estimates associated with each of the study objectives were similar for each of the surveyed locations. The following sections detail procedures that were common to multiple surveys. Site-specific differences in procedures are outlined in later sections of this report.

ONSITE CREEL SURVEY ANGLER EFFORT, CATCH, AND HARVEST ESTIMATES

Direct expansion creel surveys were conducted of the Ketchikan, Sitka, and Juneau marine boat sport fisheries. The harvest of chinook salmon by sport anglers was estimated from information collected via stratified random multistage sample surveys. Strata were defined according to unique combinations of biweekly periods, type of day (e.g., weekday vs. weekend-holiday), time of day (early vs. late) and, in some instances, derby versus non-derby periods.

Two general sampling designs were used within each stratum. For the Ketchikan and Juneau surveys, a three-stage sample survey was conducted. Within any stratum for these two surveys, days to sample represented the first sampling stage, and were selected at random without replacement (WOR). The various access locations at which marine boat sport anglers land their harvested fish represented the second sampling stage. As such, within any selected day within each stratum, at least two harbors were selected at random WOR for surveying. During each sampled day, a creel technician attempted to interview all exiting boat-parties[3] at each of the selected access locations during the sampled days within each stratum. If all boat-parties could not be interviewed, any missed boat-parties were counted. Boat-parties represented the third sampling stage in these three-stage surveys.

A four-stage sample survey was conducted at Sitka. For this survey, access locations to sample represented the first sampling stage, with days within each stratum at each sampled location representing the second stage sampling units. Periods within the sampling day represented the third sampling stage. At some sites and for some strata, only one sampling period existed; for these strata at any sampled day-location combination, the entire period was sampled. Minimally, two periods were sampled for each day-location combination for strata with more than one period per sampling day. Finally, boat-parties to interview represented the fourth sampling stage units in this survey.

The sampling designs for the surveys conducted in Juneau and Ketchikan were essentially equivalent to the surveys conducted in previous years at these locations (see Hubartt et al. 1993-1999). One important access location, Clover Pass Resort near Ketchikan, could not be sampled because of access problems.

In 1995 at Sitka, the "type of day" stratum and the definition of sampling day were modified so that unbiased estimates of angler effort, catch, and harvest could be obtained in the most efficient manner possible. These changes have been maintained since that time.

Data collected from each interviewed boat-party included number of rods fished, hours fished, trip type (charter or non-charter), number of days fished in trip, location fished, target (e.g., salmon, bottomfish, crab or shrimp), and number of fish kept and/or released by species. Crab effort (boat-days fished and number of pots or rings fished) and harvest was recorded in Juneau and Ketchikan. In Ketchikan, numbers of shrimp harvested were also recorded in multiples of 10. All data-recording procedures were outlined in detail in site-specific Creel Technician Manuals, and computer data files and analysis programs are listed in Appendix C1.

Estimates of harvested chinook salmon at each of the three surveyed marine boat sport fisheries were calculated according to standard direct expansion equations for stratified multistage sampling designs (Appendices A1 and A2). Mean harvest of boat-parties interviewed during a sample was expanded by the number of boat-parties counted exiting the fishery during each sample to obtain the estimates for each sample. Means across sample periods were similarly expanded by the number of periods within a sampling day to obtain the estimates at a sampled access location for the four-stage surveys. Means across days within a sampled location were then expanded by the number of possible days, to obtain the location estimate of catch, effort, or harvest for the four-stage surveys. Finally, across-location means were expanded by the number of access locations in a stratum to obtain the stratum estimates. Across-stratum

[3] A boat-party is defined as all sport anglers from one boat exiting a fishery at an access location.

estimates of harvest were obtained by summation across strata. Estimates were obtained similarly for the three-stage designs, with appropriate reordering of calculations.

Estimates of harvest of other species by surveyed boat anglers were calculated similarly. Additionally, estimates of the total catch (caught and released as well as caught and kept) of all species of interest were calculated in a similar manner.

BIWEEKLY ESTIMATES OF COHO SALMON HARVEST PER UNIT EFFORT

Data collected during creel surveys of the Ketchikan, Juneau and Sitka marine boat sport fisheries were used to calculate mean biweekly coho salmon harvest per unit effort (HPUE) of boat anglers in harvest per angler-hour. Harvest instead of total catch was used, because relatively few coho salmon were released, and those released may not have been correctly identified to species. Estimates obtained by these procedures were indicative of the abundance of coho salmon (L. D. Shaul, Alaska Department of Fish and Game, Douglas, personal communication). Mean HPUE from these fisheries was considered to be an index of abundance under the traditional linear model:

$$hpue_k = qN + \varepsilon_k \qquad (1)$$

where $hpue_k$ is harvest per unit of effort during the k^{th} angler-trip, N is the abundance of fish, q is the catchability coefficient, and ε is a random error with mean equal to zero and variance equal to σ^2. In this case, each angler-trip was considered a separate, replicated sample in a test fishery.

All boat-parties interviewed within each biweek surveyed at each location were treated as equally weighted test samples (i.e., ignoring strata and sampling stages). HPUE in terms of coho salmon harvested per angler-hour of effort was estimated for each biweek using procedures outlined in Appendix A3.

HATCHERY AND TAGGED WILD STOCK CONTRIBUTION ESTIMATES

Creel technicians attempted to inspect each harvested chinook and coho salmon for a missing adipose fin indicating the probable presence of an internal CWT. Catches of chinook salmon and coho salmon checked for clipped adipose fins were recorded as "sampled," and catches not checked were recorded as "not sampled." Numbers of chinook and coho salmon inspected for a clipped adipose fin were recorded, and heads from salmon with clipped adipose fins were collected and identified with a uniquely numbered cinch strap. These heads were forwarded to the ADF&G Commercial Fisheries (CF) Division CWT laboratory for eventual dissection, tag removal, and decoding.

Information from the sampling programs as well as the coastwide CWT database was used to estimate the contributions of both Alaskan and non-Alaskan hatchery chinook salmon according to procedures described by Bernard and Clark (1996). Since not all hatchery releases from Oregon, Washington, and Idaho are tagged, the estimates of non-Alaskan contributions should be considered as minimal estimates. In addition, contributions of wild tagged stocks were also estimated after obtaining the tagging fraction. In some instances, wild stock tagging fractions were not obtained and therefore tags were only expanded by the sampling fraction.

The contribution of chinook and coho salmon with a particular tag code to the marine fisheries surveyed was estimated using procedures outlined in Appendix A4, which essentially followed the approach proposed by Bernard and Clark (1996).

ADDITIONAL CODED WIRE TAG SAMPLING

Technicians sampled for clipped adipose fins on chinook and coho salmon taken by boat parties returning to Wrangell harbors from 26 April through 4 July, Petersburg harbors from 3 May through 11 July, and Craig and Klawock harbors from 26 April through 12 September. Sampling effort in the Craig area was expanded to Klawock in 1999 to increase sampling rates for this rapidly growing fishery. Some additional sampling for adipose-clipped fish was also conducted in Ketchikan from 29 May to 26 September, and in Juneau from 26 May through 26 September. Specific equations for estimating the relative contributions of hatchery stocks in Wrangell, Petersburg, and Craig/Klawock are detailed in Appendix A4.

AGE, LENGTH, AND WEIGHT ESTIMATES

Estimates of Chinook Salmon Age Composition and Mean Length-at-age

As time permitted, harvested chinook salmon were sampled for scales for age determination. Four scales were taken from the preferred area (Welander 1940 and INPFC 1958) of each chinook salmon sampled. Scales were then mounted on gum cards, and impressions were made in cellulose acetate (Clutter and Whitesel 1956). The ages were determined by reading the scales using procedures from Olsen (1995). Lengths in millimeters (tip of snout to fork of tail) of these chinook salmon were also recorded.

For the estimation of age composition and mean length-at-age, all data collected from harvested chinook salmon within each of these fisheries were treated as one sample (i.e., ignoring internal stratification and sampling stages). Age composition estimates were calculated from the sample data using the procedures outlined in Cochran (1977). Estimates of mean length by age group of chinook salmon sampled from the harvest were calculated following procedures outlined by Sokal and Rohlf (1981). Each survey's entire sample was used in an unweighted fashion to obtain the length-at-age statistics.

Average Weight of Pacific Halibut

In pursuit of Objective 6, Pacific halibut landed by boat parties within all surveyed fisheries were sampled for length in order to estimate the average net weight.

Optimum relative sampling distributions were calculated for charter and non-charter groups using the optimum allocation formula for stratified sampling (Thompson 1992). Mean net weights and standard deviations were computed for each group within each port from 1998 biological sampling data. Stratum weights were based on group specific harvests obtained from the 1997 SWHS. Since the ports of Petersburg and Wrangell are in the same SWHS area, we elected to estimate mean weights for these two fisheries combined. A template was designed incorporating the mean net weights, standard deviations, and the harvests (for optimum sample proportions) for each port and user group. The overall minimum sample size for each port (combined user groups) was determined by solving (using EXCEL Goal Seek) for a relative precision of ±10% at the 90 percent level of confidence. The final result was a minimum target sample size for each user group within each port.

In order to collect at least the minimum sample sizes for each group and port, a systematic sampling protocol was employed. Days were sub-sampled and the number of days to sample over the season was based on the sampling rate tabulated from 1998 interview data.

Subsampling occurred every 6th day in Juneau, every 5th day in Sitka and Craig/Klawock, and every 3rd day in Ketchikan and Petersburg/ Wrangell. Starting days were randomly selected (e.g., number between 1 and 6 for Juneau, 1 and 5 for Sitka, etc.) for the first week, and continued according to the systematic schedule noted above for each port. If the next selected sample day happened to fall on 1) a non-work day, 2) a day that was only being catch sampled (Juneau, Sitka, and Ketchikan), or 3) a designated derby sampling day, the closest "standard day" worked was selected for sampling (with a "coin flip" to resolve ties). In those instances noted above, only the day to conduct sampling was adjusted forward; counts to the next subsample day were not. In ports where there were both creel and catch sampling programs (Juneau, Sitka, and Ketchikan), only creel samplers reprioritized their sampling goals on the designated days, while catch samplers maintained their assigned priorities for salmon. Data collected on designated sampling days were denoted as such on the mark-sense form to keep them separate (not part of the regular biological sampling program).

There was variation in the number of charter vs. non-charter harvested Pacific halibut that samplers encountered during interviews on designated days. Therefore, the sampling rate used was one that exceeded the minimum sample size goals. This meant over-sampling one of the user groups.

Procedures outlined by Clark (1992) were used to convert length data to estimates of round and

net weights. All lengths collected were measured in millimeters (mm) using total length (TL). Differences in length distributions between the "halibut sampling days" and the other sampling days were analyzed post-season to determine if they were significant for purposes of pooling data. Inseason monitoring of port and class specific Pacific halibut samples was maintained in order to ensure minimum sample size goals were met.

ASSUMPTIONS

The assumptions necessary for estimates of angler effort, catch, harvest, and HPUE from these surveys to be unbiased were:

1. Anglers accurately reported their hours of fishing effort and the number by species of fish harvested and released.
2. No significant number of boat-parties returned between evening civil twilight (i.e., one-half hour after sunset) and the beginning of early-day surveys, or at access locations other than those surveyed (this assumption was violated in Ketchikan in 1997, 1998 and 1999 because a major access location, Clover Pass, refused access to staff).
3. Anglers accurately reported the number of rods fished during the period fished so that effort (rod-hours) and HPUE could be calculated correctly (this assumes that if a boat returned with three anglers and two of them fished for three hours and one fished for two hours, both combinations of rods and hours were recorded as two rods for three hours and one rod for two hours and not as three rods for three hours).

In addition to the above assumptions, the following conditions must be met for unbiased estimates of contributions of CWT stocks to the harvest:

4. Relative contributions of different stocks of salmon associated with a CWT release lot to the harvest did not vary appreciably within a biweekly period, or that fish were sampled proportionally throughout the biweekly period.

Similarly, the following assumptions are necessary for unbiased estimates of length-at-age, age composition, and average weight:

5. Length-at-age, age composition, and average weight did not vary substantially within the sampling season, or sampling was proportional to harvest throughout the season.
6. Measured fish were representative of the entire harvest.

RESULTS

Detailed tables presenting total estimates of finfish effort, harvest, and catch for all species monitored in the Juneau, Sitka, and Ketchikan areas, as well as shellfish effort and harvest, are found in Appendices B1 through B3. Appendices B4 through B6 present biweekly estimates and variances for effort, harvest, and catch for all species monitored for these three fisheries. Summary data from catch sampling programs appear in Appendices B7 (Petersburg), B8 (Wrangell), and B9 (Craig/Klawock).

ANGLER EFFORT

An estimated 715,118 (SE = 23,914) angler-hours of effort were expended in the Ketchikan, Sitka, and Juneau marine boat sport fisheries during the time periods sampled (Table 1). Eighty percent (80%) of total effort in angler-hours was targeted on salmon in Ketchikan, 80% in Juneau, and 74% in Sitka. In 1999, total effort in Ketchikan and Sitka was 54% and 72%, respectively, of that expended in Juneau. Major salmon derbies in Ketchikan, Juneau, and Sitka increased the amount of effort targeted on salmon, as 12%, 18%, and 14% of the total salmon fishing effort, respectively, occurred during these short time periods. Bottomfish (primarily Pacific halibut) were the other major target of anglers.

CHINOOK SALMON FISHERIES

An estimated 31,768 (SE = 1,590) chinook salmon were harvested in the Ketchikan, Sitka, and Juneau marine boat sport fisheries (Table 2).

Table 1.–Summary of estimated total and derby angler effort by target for the Ketchikan, Sitka, and Juneau marine boat sport fisheries during 1999.

	TOTAL EFFORT BY TARGET AND TIME PERIOD			
	Ketchikan[a] 4/26–9/26	Juneau 4/26–9/26	Sitka 4/26–9/26	Total
Boat-hours	62,303	121,524	75,606	259,43
SE	3,687	5,900	3,531	7,80
Salmon-hours	136,284	252,169	168,793	557,24
SE	10,769	13,924	8,515	19,55
Bottomfish-hours[b]	33,359	63,578	57,899	154,83
SE	2,865	5,146	4,514	7,42
Angler-hours[c]	169,664	316,442	229,012	715,11
SE	11,469	17,261	11,934	23,91
% salmon-hours[d]	80	80	74	7

	DERBY EFFORT BY TARGET AND TIME PERIOD			
	Ketchikan[a] 5/39–31, 6/05–06, 6/12-13	Juneau 8/20–22	Sitka 5/29–31, 6/05-06	Total
Boat-hours	8,032	16,767	10,257	35,05
SE	1,467	2,758	824	3,23
Salmon-hours	16,845	45,527	23,707	86,07
SE	2,852	8,329	1,825	8,99
Bottomfish-hours	1,785	1,428	1,950	5,16
SE	381	335	437	66
Angler-hours	18,631	46,955	25,665	91,25
SE	3,040	8,375	2,055	9,14
% of total salmon fishery[e]	12	18	14	1

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Includes hours fished for Pacific halibut, rockfish, and other bottomfish.

[c] Includes all targeted and non-targeted effort.

[d] (salmon-hours/total angler-hours) * 100.

[e] (derby salmon-hours/total salmon-hours) * 100.

Relative precisions of the estimated chinook salmon harvests were within our goal of ± 20% of the true value 90% of the time at all locations. About 66% (20,804) of the monitored harvest of chinook salmon was taken in the Sitka fishery, the Juneau fishery accounted for an additional 19% of the harvest, and 15% was taken in the Ketchikan fishery. Most of the chinook salmon harvested were at least 28″ in length, but an estimated 894 small (<28″) chinook salmon were also harvested, demonstrating a modest response to emergency openings in hatchery terminal areas.

Harvest of chinook salmon during the Ketchikan King Salmon Derby constituted 13% of the total chinook salmon harvest in the Ketchikan marine fishery, and 8% of the chinook salmon harvest in the Juneau fishery was taken during the Juneau Golden North Salmon Derby (Table 2). In Sitka, 10% of the total chinook salmon harvest was taken during the Sitka Salmon Derby, and 637 chinook were entered in the derby. Anglers entered a total of 1,564 chinook salmon in the Ketchikan, Juneau and Sitka derbies from a harvest of 3,265 fish during the derby time periods. In the Petersburg Salmon Derby, 479 chinook salmon were entered.

About 29% of the estimated harvest of chinook salmon in both the Ketchikan and Juneau boat fisheries were sampled for coded wire tags, compared to 26% in Sitka (Appendix B10). In aggregate, 8,329 chinook salmon from these three fisheries were sampled.

An estimated 23% of chinook salmon harvested in the combined Ketchikan, Sitka, and Juneau

Table 2.–Summary of estimated harvests of chinook salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed during 1999.

TOTAL CHINOOK SALMON HARVESTS

Sport fishery	Time period	Chinook ≥28″	Chinook <28″	Combined	SE	Relative precision ($\alpha = 0.10$)
Ketchikan[a]	4/26–9/26	4,494	320	4,814	518	18
Juneau	4/26–9/26	5,639	511	6,150	423	11
Sitka	4/26–9/26	20,741	63	20,804	1,443	11
Total		30,874	894	31,768	1,590	8

DERBY CHINOOK SALMON HARVESTS

		Chinook ≥28″		Chinook <28″		Total harvested		
Major salmon derbies	Time period	Entered	Total[b]	Entered	Total[b]	Number	SE	%[c]
Ketchikan King Salmon Derby[a]	5/29–31, 6/05-06, 6/12–13	530	612	0	0	612	15	13
Juneau Golden North Salmon Derby	8/20–8/22	396	505	1	1	506	27	8
Sitka Salmon Derby	5/29–31, 6/05-06	637	2,144	0	3	2,147	267	10
Petersburg Salmon Derby[d]	5/22–5/25	479	479	0	0	479	0	0

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Includes entered and take-home harvests.

[c] (total derby harvest/total area harvest) * 100.

[d] Number taken home was not estimated.

marine boat fisheries were of Alaska hatchery origin (Table 3). Relative precision of Alaska hatchery contribution estimates were within ±25 percentage points of the true value 90% of the time at all locations, and they ranged from 3% to 13%. Large numbers of hatchery fish also originated in British Columbia and Washington, with a few from Oregon and Idaho. In aggregate, 42% of the chinook salmon harvested in these three fisheries originated in hatcheries.

Twelve percent of the harvest of chinook salmon in Sitka came from Alaska hatcheries, and the overall hatchery contribution was 40% of the harvest. Most Alaska hatchery chinook salmon harvested in Sitka were produced at the Medvejie hatchery. In Ketchikan, 48% of the harvest of chinook salmon was from Alaska hatcheries, and the overall hatchery contribution to the Ketchikan fishery totaled 56%. About 66% of the Alaska hatchery chinook salmon taken in Ketchikan originated from the Whitman Lake hatchery. About 39% of the chinook salmon harvest in the Juneau boat fishery was of Alaska hatchery origin, with most from the Gastineau and Hidden Falls hatcheries. Detailed hatchery contribution estimates by tag code are listed in appendices for the Ketchikan fishery (Appendix B11), Juneau fishery (Appendix B12), and Sitka fishery (Appendix B13). In addition, 12 wild stock recoveries were expanded to estimate contributions.

In the Petersburg fishery, 591 chinook salmon were examined for clipped adipose fins, and we estimated about 33% of these fish came from hatcheries with about 32% from Alaska hatcheries (Appendix B14). The largest contributor to the Petersburg harvest was the Crystal Lake hatchery. About 14% of the 284 chinook salmon sampled

Table 3.–Contributions of hatchery chinook salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 26 April–26 September, 1999.

	MARINE BOAT SPORT FISHERY			
Region or hatchery	Juneau	Ketchikan[a]	Sitka	**Total**
British Columbia	1	252	4,155	4,408
Idaho	0	1	3	4
Oregon	0	2	150	152
Washington	0	142	1,537	1,679
Non-Alaskan total	1	397	5,845	6,243
SE	0	180	945	962
Alaska				
Big Boulder instream	4	0	0	4
Carroll Inlet	0	146	0	146
Crystal Lake	77	17	10	104
Crystal Lake/Earl West Cove	24	0	0	24
Crystal Lake/Neets Bay	12	56	0	68
Deer Mountain	0	287	0	287
Gastineau	1,495	0	32	1,527
Hidden Falls	588	0	197	785
Little Port Walter	63	3	85	151
Medvejie	0	0	1,999	1,999
Neets Bay	0	174	34	208
Sheldon Jackson	0	0	118	118
Snettisham	54	0	14	68
Tamgas Creek	32	92	11	135
Whitman Lake	49	1,531	32	1,612
Alaskan total	2,398	2,306	2,532	7,236
SE	305	373	431	646
Relative precision (%)[b]	8	13	3	3
Total all areas	2,399	2,703	8,377	13,479
SE	305	435	1,096	1,218
Relative precision (%)[b]	8	15	9	6
Chinook salmon harvest	6,150	4,814	20,804	31,768
SE	423	518	1,443	1,590
% Alaska hatchery	39	48	12	23
% total hatchery	39	56	40	42

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] ((SE * 1.645) / total harvest) * 100, $\alpha = 0.10$.

from the Wrangell fishery came from Alaska hatcheries and 3% were from non-Alaskan hatcheries (Appendix B15). Overall, 36% of the 1,315 chinook salmon sampled in Craig and Klawock came from hatcheries, but only 3% were from Alaska hatcheries (Appendix B16). A single tagged chinook from the Unuk River wild stock was recorded at Petersburg and another at Craig/Klawock (Appendices B14 and B16).

In total, 1,914 chinook salmon were successfully aged from the six fisheries sampled (Table 4; Appendix B17). About 27% of chinook salmon sampled lacked a freshwater annulus (age-0.), which usually indicates non-Alaskan origin (Van Alen 1988). Saltwater ages varied considerably; an estimated 98% of the chinook salmon harvested during the Juneau Golden North Salmon Derby were age-.3 or less, whereas only 49% of chinook salmon sampled in the Craig/Klawock fishery were age-.3 or less. The sampled harvest across all surveyed fisheries consisted of 28% males and 72% females. Mean length-at-age of sampled chinook salmon varied only slightly among the fisheries surveyed (Appendix B18). In general, fish of a given age were smaller in Juneau than in the other fisheries.

Table 4.–Summary of the age composition of chinook salmon sampled in selected marine sport fisheries in Southeast Alaska during 1999.

	FRESHWATER AGE COMPOSITION				
	----------Age 0.----------		--------Age 1. or more--------		
Sport fishery	Sample size	Percent	Sample size	Percent	Total sampled
Ketchikan	40	13	279	87	319
Juneau non-derby	5	1	564	99	569
Juneau Derby[a]	0	0	49	100	49
Sitka	414	57	315	43	729
Petersburg	3	4	69	96	72
Wrangell	7	8	86	92	93
Craig/Klawock	56	67	27	33	83
Total	525	27	1,389	73	1,914

	SALTWATER AGE COMPOSITION				
	---------Age .3 or less---------		--------Age .4 or more--------		
Sport fishery	Sample size	Percent	Sample size	Percent	Total sampled
Ketchikan	242	76	77	24	319
Juneau non-derby	412	72	157	28	569
Juneau Derby[a]	48	98	1	2	49
Sitka	405	56	324	44	729
Petersburg	38	53	34	47	72
Wrangell	51	55	42	45	93
Craig/Klawock	41	49	42	51	83
Total	1,237	65	677	35	1,914

[a] Juneau Golden North Salmon Derby.

COHO SALMON FISHERIES

Harvests of coho salmon in the Ketchikan, Sitka, and Juneau fisheries totaled an estimated 121,080 fish (SE = 8,238) (Table 5). The only monitored derby in which coho salmon were heavily targeted was the Juneau Golden North Salmon Derby, and an estimated 4,324 coho salmon (SE = 321) were taken during this event (Appendix B2).

Harvests of hatchery coho salmon were estimated from an overall sample of 31% of the coho salmon harvest (Appendix B19). Estimates of coho salmon hatchery and wild stock contributions by tag code and time period are presented in Appendix B20 for the Ketchikan fishery, Appendix B21 for the Juneau fishery, and Appendix B22 for the Sitka fishery.

An estimated 31,921 (SE = 2,872) hatchery coho salmon were taken in the combined Ketchikan, Sitka, and Juneau fisheries (Table 6). Hatchery contributions ranged from 20% in Juneau to 27% in Sitka and 33% in Ketchikan. A few hatchery coho salmon taken in Sitka and Ketchikan originated in British Columbia and Washington hatcheries, but most were from Alaska. The Neets Bay hatchery contributed the most coho salmon to the Ketchikan fishery, and Gastineau contributed

Table 5.–Summary of estimated catch and harvest of coho salmon in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed 26 April–26 September 1999.

Sport fishery	Total harvest		Total catch		
	Estimate	SE	Estimate	SE	% retained
Ketchikan[a]	20,719	2,335	21,655	2,444	96%
Juneau	26,604	2,654	27,502	2,705	97%
Sitka	73,757	7,441	76,422	7,570	97%
TOTAL	121,080	8,238	125,579	8,402	96%

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 6.–Contributions of hatchery coho salmon to the Ketchikan, Sitka, and Juneau marine boat sport fisheries of Southeast Alaska, 26 April–26 September, 1999.

Region or hatchery		MARINE BOAT SPORT FISHERY Juneau	Ketchikan[a]	Sitka	Total
British Columbia		0	172	759	931
Washington		0	67	0	67
Non-Alaskan total	(SE)	0	239 (105)	759 (176)	998 (205)
Alaska					
Burnett Inlet		0	30	70	100
Crystal Lake		0	0	22	22
Crystal Lake/Earl West Cove		0	52	376	428
Deer Mountain		0	813	67	880
Gastineau		4,562	0	123	4,685
Hidden Falls		454	0	457	911
Klawock River		0	0	108	108
Medvejie		0	0	3,539	3,539
Medvejie CIF		290	0	3,532	3,822
Nakat Inlet		0	90	546	636
Neets Bay		0	3,903	5,986	9,889
Port Armstrong		0	0	674	674
Sheldon Jackson		0	0	184	184
Tamgas Creek		0	985	2,081	3,066
Whitman Lake		0	731	1,248	1,979
Alaskan total	(SE)	5,306 (745)	6,604 (1,154)	19,013 (2,458)	30,923 (2,816)
Relative precision[b]		5	9	5	4
Total all areas	(SE)	5,306 (745)	6,843 (1,165)	19,772 (2,517)	31,921 (2,872)
Relative precision[b]		5	9	6	4
Coho salmon harvest	(SE)	26,604 (2,654)	20,719 (2,335)	73,757 (7,441)	121,080 (8,238)
% Alaska hatchery		20	32	26	26
% total hatchery		20	33	27	26

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] $((SE * 1.645) / \text{total harvest}) * 100$, $\alpha = 0.10$.

Table 7.–Harvest per unit effort (HPUE) for coho salmon (harvest per angler-hour of effort) by biweekly period in the Ketchikan, Juneau, and Sitka marine boat sport fisheries during 1999.

	HARVEST OF COHO SALMON PER ANGLER-HOUR OF EFFORT [a]					
	Ketchikan		Juneau		Sitka	
Seasonal period	HPUE	SE	HPUE	SE	HPUE	SE
5/24-6/06	0.000	0.000	0.000	0.000	0.001	0.001
6/07–6/20	0.000	0.000	0.001	0.000	0.043	0.005
6/21–7/04	0.027	0.006	0.003	0.001	0.185	0.016
7/05–7/18	0.118	0.015	0.090	0.009	0.286	0.027
7/19–8/01	0.177	0.020	0.150	0.012	0.432	0.031
8/02–8/15	0.108	0.014	0.169	0.012	0.604	0.036
8/16–8/29	0.166	0.024	0.205	0.032	0.699	0.037
8/30–9/12	0.251	0.018	0.204	0.020	0.684	0.070
9/13–9/26	0.489	0.033	0.181	0.030	0.430	0.257
All periods	0.178	0.008	0.090	0.004	0.354	0.012

[a] Does not include derby effort or harvest.

Table 8.–Summary of estimated catch and harvest of Pacific halibut, rockfish, and lingcod in the Ketchikan, Sitka, and Juneau marine boat sport fisheries surveyed 26 April–26 September 1999.

	Sport fishery	Total catch	SE	Harvest	SE	% retained
Pacific halibut	Ketchikan[a]	6,087	634	5,126	525	84
	Juneau	11,090	1,106	8,104	808	73
	Sitka	41,547	4,158	27,967	2,672	67
	Total	58,724	4,349	41,197	2,840	70
Rockfish	Ketchikan[a]	8,120	763	3,282	347	40
	Juneau	1,197	185	1,056	171	88
	Sitka	31,455	1,930	13,412	1,019	43
	Total	40,772	2,084	17,750	1,090	44
Lingcod	Ketchikan[a]	540	82	296	55	55
	Juneau	132	48	86	37	65
	Sitka	5,665	497	4,961	471	88
	Total	6,337	506	5,343	476	84

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

the most coho salmon to the Juneau fishery, and Medvejie, Neets Bay, and Tamgas Creek hatcheries were the major contributors in Sitka. About 6% of the 12,237 coho salmon examined for clipped adipose fins from the Craig/Klawock marine boat sport fishery were from Alaska hatcheries (Appendix B23). No coho salmon were sampled in Petersburg or Wrangell. Additionally, some recoveries of coho salmon from wild stocks were obtained in the Ketchikan, Juneau, Sitka, and Craig/Klawock fisheries (Appendices B20, B21, B22, and B23). Contributions of these wild-tagged stocks were estimated only when an estimate of the harvest and an estimate of the tagging fraction, θ_c, were available (Appendix A4).

The biweekly harvest per unit of effort (HPUE) for coho salmon in the Ketchikan, Juneau, and Sitka fisheries reached highs of 0.489 (SE = 0.033), 0.205 (SE = 0.032), and 0.699 (SE = 0.037) coho salmon, respectively, per angler-hour of effort (Table 7). The peak in HPUE for coho salmon occurred in late September in Ketchikan, and in late August in Juneau and Sitka. Sitka anglers experienced higher HPUEs for coho salmon than did Ketchikan and Juneau anglers all season long.

BOTTOMFISH FISHERIES

Most bottomfish effort in Southeast Alaska targets on Pacific halibut, and an estimated 41,197 (SE = 2,840) Pacific halibut were harvested in Ketchikan, Sitka, and Juneau (Table 8). Estimated average net weight (headed and eviscerated) of harvested Pacific halibut ranged from 14.2 pounds in Craig/Klawock to 31.3 pounds in the Petersburg/Wrangell area (Table 9). We estimated about 815,300 pounds (net weight) of Pacific halibut were taken in Ketchikan, Sitka, and Juneau, with about 70% of this poundage landed in Sitka.

Target sample sizes for Pacific halibut length measurements were obtained in all areas and classes except Petersburg/Wrangell where budget shortfalls reduced the length of the sampling season (Table 9). Overall, average net weight estimates in the other sampled ports were estimated to within ±10% of the true value 90% of the time. But despite exceeding the target sample sizes in most ports and classes, some class specific estimates fell short of the stated objective (relative precision = ±15% for charter in Ketchikan, and ±11%, 25%, and 23% for non-charter in Juneau, Sitka and Craig/Klawock, respectively).

Table 9.–Average length (cm), average net weight (lb), and estimated number and total net weight (lb) of Pacific halibut harvested in Southeast Alaska marine boat sport fisheries during 1999.

		Sample size		Mean length		Average net		Relative	Estimated harvest	
Sport fishery	Class	Target	Realized[c]	(cm)	SE	weight (lbs.)	SE	precision[d]	Number[e]	Net weight (thousand lb)[e]
Ketchikan										
	Charter	50	**83**	96.3	3.1	23.2	2.1	15%		
	Non-charter	208	**242**	93.7	1.6	21.5	1.3	**10%**		
	Overall[a]	258	**325**	94.3	1.4	21.9	1.1	**8%**	5,126	112.3
Juneau										
	Charter	58	**406**	83.8	0.7	13.0	0.4	**5%**		
	Non-charter	69	**292**	90.2	1.6	20.2	1.4	11%		
	Overall[a]	127	**705**	86.5	0.8	16.0	0.6	**6%**	8,105	129.7
Sitka										
	Charter	281	**982**	94.5	6.2	27.6	0.8	**5%**		
	Non-charter	78	**101**	86.3	2.4	17.6	2.7	25%		
	Overall[a]	359	**1,089**	93.7	0.6	20.5	0.7	**6%**	27,967	573.3
Petersburg/Wrangell[b]										
	Charter	86	82	112.9	2.9	37.4	3.7	16%		
	Non-charter	100	68	97.1	3.1	23.3	2.4	17%		
	Overall[a]	186	150	105.8	2.2	31.3	2.4	13%		
Craig/Klawock										
	Charter	454	451	79.9	0.8	12.1	0.6	**8%**		
	Non-charter	121	**133**	90.4	2.3	21.2	3.0	23%		
	Overall[a]	575	**584**	82.3	0.8	14.2	0.8	**9%**		
Total									41,198	815.3

[a] Includes data where class was not identified, therefore total may be more than the sum by class.

[b] Sampling was originally scheduled from May to September, but was cut short (May to July) due to budgetary reasons. Therefore, sample size targets were not realized.

[c] Target sample sizes met are noted in **BOLD**.

[d] Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100. Those estimates where the goal was achieved are in **BOLD**.

[e] Estimates of harvest were only determined in Ketchikan, Juneau, and Sitka, therefore, total net weight estimates for other areas were not calculated. Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Although rockfish are not a primary target of most Southeast Alaska sport anglers, an estimated 40,772 (SE = 2,084) rockfish were caught in the combined Ketchikan, Sitka, and Juneau fisheries (Table 8). Only 44% (17,750, SE = 1,090) of the rockfish caught were retained. Retention in Juneau, where few rockfish were caught, was higher, at 88%.

Major species composition of the rockfish harvest was estimated for the Ketchikan and Sitka fisheries (Table 10). Yelloweye rockfish comprised nearly 48% of the harvest in Sitka but only 29% of the harvest in Ketchikan. Quillback rockfish *S. maliger* (47%) were the most frequently taken species in Ketchikan, but composed only about 7% of the rockfish harvest in Sitka. Black rockfish *S. melanops* were the second most commonly harvested in Sitka at 35%. Other species in the sport harvest included copper *S. caurinus*, dusky *S. ciliatus*, and silvergrey *S. brevispinis* rockfish, along with a variety of other unidentified species. An estimated 4,961 (SE = 471) lingcod were harvested in Sitka, and 296 (SE = 55) in Ketchikan (Table 8).

Table 10.–Rockfish composition in the Ketchikan and Sitka marine boat sport fisheries during 1999 (an estimated 1,056 rockfish harvested in the Juneau marine boat sport fishery were not identified by individual species).

	Ketchikan		Sitka	
Rockfish species	Harvest[a]	%	Harvest[a]	%
Quillback	1,535	46.8	918	6.8
Dusky	220	6.7	219	1.6
Copper	56	21.7	112	0.8
Black	79	2.4	4,698	35.0
Yelloweye	961	29.3	6,367	47.5
Silvergrey	237	7.2	137	1.0
Other nonpelagic	138	4.2	962	7.2
Other pelagic	56	1.7	0	0.0
Total	3,282		13,412	

[a] The unidentified rockfish harvest (1,998 in Ketchikan and 287 in Sitka) was allocated to species by expanding the appropriate percentage of harvest in the identified harvest to the total harvest. Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

OTHER SALMONID FISHERIES

Although not usually primary targets, other salmonids such as pink, chum, and sockeye salmon, and Dolly Varden were harvested in Ketchikan, Sitka and Juneau (Table 11). Pink salmon were abundant in Ketchikan, as the estimated harvest totaled 21,460 (SE = 2,972). Only 4,326 (SE = 454) pink salmon were harvested in Sitka and 7,193 (SE = 753) in Juneau. Retention rates for pink salmon were 38% in Juneau, 45% in Sitka, and 71% in Ketchikan indicating heavier targeting of pink salmon in Ketchikan. Harvests of both chum and sockeye salmon were much less, totaling 1,453 chum salmon and 5,121 sockeye salmon for the three fisheries combined. Juneau anglers took most of the 354 Dolly Varden harvested.

SHELLFISH FISHERIES

Shellfish effort and harvests of Dungeness, Tanner, and king crab were estimated for Ketchikan and Juneau (Table 12). Shellfish effort in boat-days for the Juneau fishery was 5,130; more than four times that estimated for the Ketchikan fishery (1,211 boat-days). Since some effort was expended by divers, effort in boat-days is more comparable from fishery to fishery than effort in number of pots or rings fished. Substantial numbers of Dungeness, Tanner and king crabs were harvested in the Juneau fishery, but no king crab or Tanner crab were taken in the Ketchikan area. Shrimp harvest was estimated only in Ketchikan (57,920 shrimp, SE = 7,716).

DISCUSSION

Onsite creel surveys provide data necessary for inseason management, and they also can provide detailed fishery performance and biological information difficult to obtain with mail surveys.

For inseason management, the usefulness of onsite surveys lies in their consistency of method and coverage, so that inseason estimates can be compared with the SWHS and onsite creel estimates from previous years. Because the Clover Pass access location was not sampled in the Ketchikan fishery during 1999 (as in 1997

Table 11.–Summary of estimated total catch and harvest of pink salmon, chum salmon, sockeye salmon, and Dolly Varden in the Ketchikan, Juneau, and Sitka marine boat sport fisheries surveyed 26 April–26 September 1999.

	Sport fishery	Total catch	SE	Harvest	SE	% retained
Pink salmon	Ketchikan[a]	30,418	3,686	21,460	2,972	71
	Juneau	19,123	2,554	7,193	753	38
	Sitka	9,609	981	4,326	454	45
	Total	59,150	4,591	32,979	3,100	56
Chum salmon	Ketchikan[a]	468	79	350	61	75
	Juneau	679	90	565	83	83
	Sitka	653	176	538	156	82
	Total	1,800	213	1,453	187	81
Sockeye salmon	Ketchikan[a]	22	9	22	9	100
	Juneau	86	34	86	34	100
	Sitka	5,120	1,082	5,013	1,070	98
	Total	5,228	1,082	5,121	1,071	98
Dolly Varden	Ketchikan[a]	0	0	0	0	0
	Juneau	1,250	602	347	70	28
	Sitka	7	7	7	7	100
	Total	1,257	602	354	70	28

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 12.–Estimated effort for, and harvest of Dungeness crab, king crab, Tanner crab and shrimp in the Ketchikan and Juneau marine boat sport fisheries surveyed 26 April–26 September 1999.

	Effort		Harvest			
Sport Fishery	Boat-days	SE	Dungeness crab	Tanner crab	King crab	Shrimp
Ketchikan[a]	1,211	182	4,959	0	0	57,920
Juneau[b]	5,130	320	5,599	1,773	7,339	
Total	6,341	368	10,558	1,773	7,339	57,920

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Shrimp harvest not estimated in Juneau.

and 1998), it is known that estimates were biased low in comparison to previous surveys. The probable bias could have ranged up to 40%, but was more likely in the range of 20%. Therefore, in comparisons with past Ketchikan creel surveys, estimates are going to be highly affected by the bias in the 1997, 1998, and 1999 estimates.

Effort, harvest and total catch estimates from the three creel surveys reported here should not be considered to encompass all of these three fisheries. Overall statistics are best estimated by the SWHS (Howe et al. 1999). Estimates for chinook salmon in the Juneau and Ketchikan fisheries are incomplete because there were no surveys of: (1) harvests occurring outside of the

survey periods; (2) private moorages on the road system or remote moorages, docks, or lodges inaccessible from the road system; (3) the night period from the end of civil twilight to the beginning of surveys at about 0800; and (4) boat parties which are not sampled because of being missed by creel samplers. As previously discussed, omission of the Clover Pass access location in Ketchikan during 1999 had the largest impact. Mills and Howe (1992) reported that SWHS estimates were generally about 10% higher than creel survey estimates for comparable surveys from the same geographic areas in Southeast Alaska.

Onsite creel surveys of the Juneau marine boat sport fishery have been conducted every year since 1960 (Schmidt et al. 1973; Schmidt and Robards 1974, 1975; Mattson 1975; Robards 1976, 1977, 1978; Marriott et al. 1979; Schwan 1980, 1981, 1982; Neimark and Schwan 1983; Neimark 1984, 1985; Mecum and Suchanek 1986, 1987; Bingham et al. 1988; Suchanek and Bingham 1989, 1990, 1991, 1992; and Hubartt et al. 1993, 1994, 1995, 1996, 1997, 1998, 1999). These reports also present results from other surveys that have been done more sporadically. The Ketchikan fishery has been monitored for the entire spring and summer season since 1984, except for a one-year hiatus in 1985. The Sitka fishery was not surveyed in 1990, 1991, or prior to 1986, but was surveyed in the spring in 1986 and 1989, and for most of the season (April or May through August or September) in 1987–1988 and 1992–1999. The Petersburg and Wrangell fisheries were not surveyed in 1990 or 1991, but were consistently surveyed in the spring from 1983–1989 and during 1992–1994; and in Petersburg in 1995. Additional catch sampling results are presented in these reports for Wrangell from 1995-1999, Petersburg from 1996–1999, and Craig from 1993–1999.

The Juneau and Ketchikan marine boat fisheries have been consistently surveyed from approximately mid-April or early May through late September or, occasionally, early October. Among-year comparisons of angler effort and harvest for a given fishery are confounded by some variation in the time periods surveyed from year to year. Effort and harvest at either the beginning or the end of the survey season is small, however, in comparison to effort during the middle of the season. Among-year comparisons are generally valid, but the variations in survey periods should be noted. Variances for the harvest estimates have only been generated since 1987, so it is not possible to do statistical comparisons with prior years. In the following discussion, it should be noted that in some instances it might not be possible to show a statistically significant difference between years.

ANGLER EFFORT

Angler-hours of fishing effort in the Juneau and Ketchikan marine fisheries have been relatively stable or declining for the past few years while effort in the Sitka fishery has been generally increasing (Table 13; Figure 2). Total effort in the Juneau fishery during 1999 was 6% higher than in 1998, but 10% lower than the 1983–1998 average of 350,707 angler-hours. In Ketchikan, total 1999 effort was down 17% from 1998, and 32% below the 1984–1998 average of 250,469 angler-hours. This apparent decline may have been due entirely to the failure to sample Clover Pass. Effort in the Sitka fishery increased, as total effort during 1999 was 13% higher than in 1998 and 55% higher than the 1987–1998 average.

Estimated effort for both salmon and bottomfish was below average in Juneau and Ketchikan in 1999 (Table 13; Figure 2). In Juneau and Ketchikan, 80% of the 1999 effort targeted salmon, slightly above average for both fisheries. In the Sitka fishery, salmon effort and bottomfishing effort were above average by 62% and 35%, respectively.

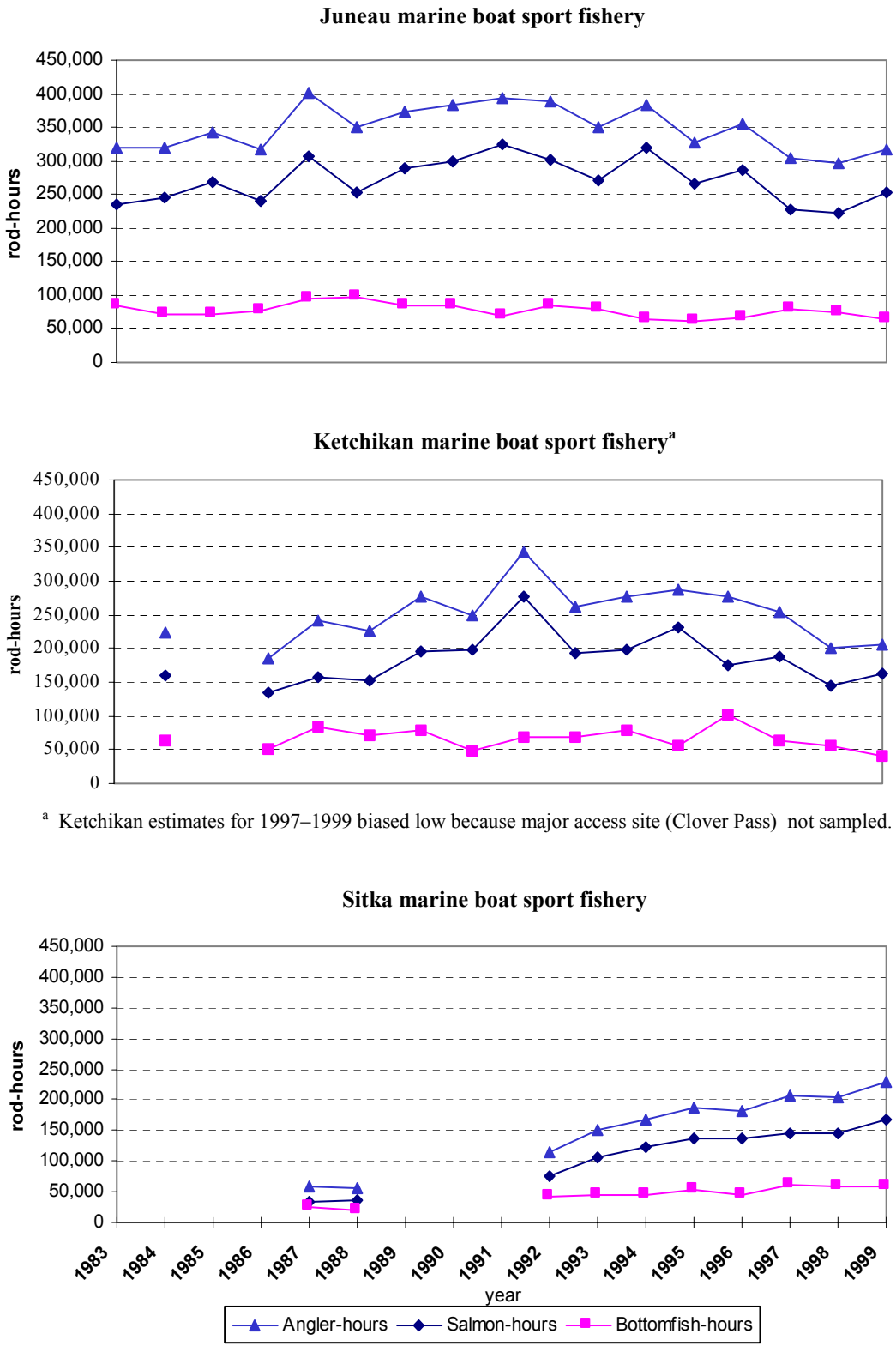
CHINOOK SALMON FISHERIES

Total harvest of chinook salmon in the Juneau marine boat fishery has shown little trend since 1983, whereas the Ketchikan harvest increased to a peak in 1991 and then steadily declined to l6% of the 1991 peak in 1998 (Figure 3, Table 14). In 1999, the Ketchikan harvest more than doubled to 4,814 but still remained below the 1984-1998 average of 5,087. The Juneau harvest of 6,150 chinook salmon was also below the average even though the harvest was 49% above the 1998 harvest. Chinook harvests in the Sitka

Table 13.–Estimated angler effort in the Juneau, Ketchikan and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

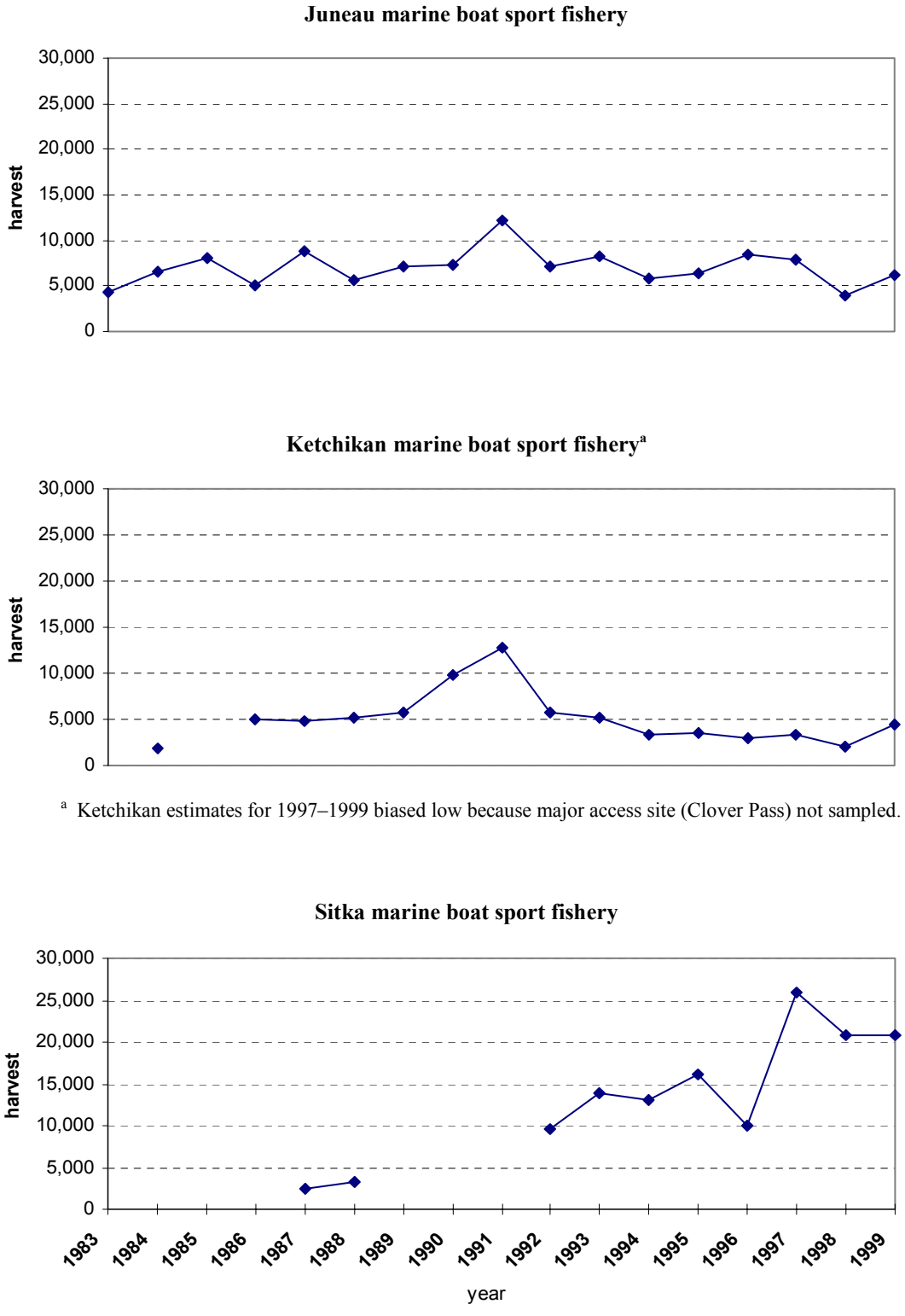
Sport fishery	Year	Survey dates	Salmon-hours Estimate	Salmon-hours Percent	Bottomfish-hours Estimate	Bottomfish-hours Percent	Total angler-hours
Juneau	1983	4/17-10/01	236,344	74	84,259	26	320,603
	1984	4/29-9/29	246,732	77	72,090	23	318,822
	1985	4/15-9/29	269,077	79	72,381	21	341,458
	1986	4/14-10/05	240,921	76	77,165	24	318,086
	1987	3/16-9/27	307,124	76	94,658	24	401,840
	1988	4/11-9/25	254,196	72	96,188	27	351,247
	1989	4/24-9/24	287,676	77	85,354	23	373,504
	1990	4/23-9/23	300,167	78	83,106	22	383,976
	1991	4/15-9/29	324,788	82	69,475	18	394,275
	1992	4/27-9/27	301,588	78	84,718	22	388,498
	1993	4/26-9/26	270,838	77	78,820	23	349,965
	1994	4/25-9/25	320,385	83	63,398	16	384,528
	1995	4/24-9/24	265,923	81	60,158	18	326,807
	1996	4/22-9/22	287,481	81	67,555	19	355,381
	1997	4/28-9/28	226,921	74	78,435	26	305,097
	1998	4/27-9/27	221,598	75	75,288	25	297,229
	Average		272,610	78	77,691	22	350,707
	1999	4/26-9/26	252,169	80	63,578	20	316,442
	% of average		93		82		90
Ketchikan[a]	1984	4/29-9/29	161,100	72	62,625	28	223,725
	1985	----------no comparable survey----------					
	1986	4/28-9/28	133,518	72	51,208	28	184,726
	1987	4/20-9/27	157,306	65	84,954	35	242,274
	1988	4/11-9/25	153,086	68	71,611	32	225,779
	1989	4/24-9/24	195,974	71	79,958	29	276,516
	1990	5/07-9/23	199,063	80	49,347	20	248,618
	1991	4/29-9/29	275,856	80	67,842	20	343,698
	1992	4/27-9/27	192,269	73	69,366	27	261,635
	1993	4/26-9/26	198,960	72	78,002	28	276,969
	1994	4/25-9/25	230,372	80	56,092	20	286,464
	1995	4/24-9/24	175,765	63	101,381	37	277,146
	1996	5/6-10/6	188,947	74	62,673	25	253,977
	1997	4/28-9/28	144,735	72	55,242	28	199,977
	1998	4/27-9/27	163,855	80	41,194	20	205,063
	Average		183,629	73	66,535	27	250,469
	1999	4/26-9/26	136,284	80	33,359	20	169,664
	% of average		74		50		68
Sitka	1987	4/20-9/13	33,130	56	24,266	41	58,814
	1988	4/11-9/25	35,763	65	18,493	34	54,766
	1989	----------no comparable survey----------					
	1990	no survey					
	1991	no survey					
	1992	5/11-8/30	74,183	64	40,756	35	115,031
	1993	4/26-9/26	107,184	71	44,480	29	151,829
	1994	4/25-9/25	123,971	74	43,363	26	168,146
	1995	4/24-9/24	135,866	72	51,710	28	188,000
	1996	4/22-9/22	136,585	75	45,075	25	182,513
	1997	4/28-9/28	145,114	70	61,711	30	207,288
	1998	4/27-9/27	144,850	71	57,378	28	202,818
	Average		104,072	70	43,026	29	147,689
	1999	4/26-9/26	168,793	74	57,899	25	229,012
	% of average		162		135		155

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled in 1997, 1998, or 1999.



[a] Ketchikan estimates for 1997–1999 biased low because major access site (Clover Pass) not sampled.

Figure 2.–Estimated effort in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.



[a] Ketchikan estimates for 1997–1999 biased low because major access site (Clover Pass) not sampled.

Figure 3.–Estimated harvests of chinook salmon in the Juneau, Ketchikan, and Sitka marine boat sport fisheries, as determined by onsite creel surveys.

Table 14.–Estimated harvest of chinook salmon in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

Year	Juneau marine[a]	Juneau Golden North Derby	Ketchikan marine[b]	Sitka marine
1983	4,316	872		
1984	6,474	855	1,820	
1985	8,133	1,222		
1986	5,050	1,073	5,006	
1987	8,893	1,005	4,723	2,466
1988	5,683	677	5,245	3,177
1989	7,074	609	5,752	
1990	7,335	493	9,869	
1991	12,234	522	12,730	
1992	7,114	603	5,670	9,588
1993	8,337	243	5,277	13,779
1994	5,819	678	3,374	13,139
1995	6,371	334	3,499	16,048
1996	8,464	784	2,931	10,078
1997	7,952	472	3,245	25,850
1998	4,128	409	2,072	20,914
Average	7,086	678	5,087	12,782
1999	6,150	506	4,814	20,804
% of average	87	75	95	163

[a] Includes Juneau Golden North Salmon Derby harvest.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled in 1997, 1998, or 1999.

fishery have been generally increasing since 1992. The 1999 Sitka harvest of 20,804 was similar to 1998, but 63% above average.

Hatchery contributions of chinook salmon to the Juneau and Ketchikan fisheries increased steadily during the late 1980s but have remained fairly consistent since about 1990 (Table 15; Figure 4). An estimated 39% of the 1999 chinook salmon harvest in Juneau originated in Alaska hatcheries, compared to the 1983–1998 average of 21%. Harvests of Alaska hatchery chinook salmon are of value because these fish do not count toward U.S./Canada Pacific Salmon Treaty catch totals. An estimated 48% of the 1999 chinook salmon harvest in Ketchikan originated in Alaskan hatcheries, a percentage substantially higher than the average of 36%. In Ketchikan, an estimated 56% of the 1999 harvest originated in hatcheries, in comparison to the average of 48%.

In Sitka, a much higher proportion of chinook salmon originates in non-Alaska hatcheries than in Ketchikan or Juneau (Table 15; Figure 4). In 1999, the total hatchery percentage of 40% in Sitka was below average, and the Alaska hatchery percentage of 12% was near average.

COHO SALMON FISHERIES

The coho harvest in Southeast Alaska during 1999 was the highest on record. This was primarily because the Sitka area harvest of 73,757 coho salmon was more than four times the average, and set a new record high harvest for Southeast Alaska sport fisheries (Table 16). The 1999 harvest of 20,719 coho salmon in the Ketchikan area was 11% below the average of 23,213, but the Juneau area harvest of coho salmon (26,604) was 37% above the average of 19,415. The Juneau Golden North Salmon derby harvest of 4,324 coho salmon was 49% above the average of 2,895 and the fourth highest coho derby harvest on record.

Harvests of coho salmon in the Juneau, Ketchikan and Sitka areas are being increasingly supplemented by hatchery fish (Table 17). Hatchery coho salmon comprised 20% of the 1999 harvest in Juneau, and was near the highest recorded. The Ketchikan fishery has been much

Table 15.–Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1999.

	Juneau marine				Ketchikan marine				Sitka marine			
Year	Total	% of harvest	Alaska	% of harvest	Total	% of harvest	Alaska	% of harvest	Total	% of harvest	Alaska	% of harvest
1983	46	1	25	1	350	10	233	6				
1984	577	9	444	7	432	24	333	18				
1985	1,037	13	831	10	862	34	838	33				
1986	1,032	20	918	18	2,226	44	1,638	33				
1987	2,060	23	2,015	23	1,409	30	999	21	150	6	53	2
1988	1,210	21	979	17	1,747	33	1,405	27	1,026	32	66	2
1989	1,018	14	865	12	2,992	52	2,082	36				
1990	2,011	27	1,584	22	6,023	61	4,511	46				
1991[a]	4,279	37	2,957	26	8,373	66	7,035	55				
1992	2,958	42	1,762	25	3,628	64	2,604	46	4,074	42	1,092	11
1993	1,511	18	1,446	17	3,425	65	2,234	42	7,351	53	1,468	11
1994	2,127	37	1,895	33	2,393	71	1,378	41	6,210	47	1,642	12
1995	2,933	46	2,873	45	888	25	723	22	9,052	56	5,702	36
1996	2,430	29	2,360	28	1,576	54	1,131	39	2,966	29	1,730	17
1997[b]	2,055	26	1,730	22	1,098	35	1,059	34	14,131	55	2,755	11
1998[b]	1,607	39	1,509	37	1,647	79	1,014	49	10,302	49	875	4
Average	1,806	25	1,512	21	2,442	48	1,826	36	6,140	48	1,709	13
1999[b]	2,399	39	2,398	39	2,703	56	2,306	48	8,377	40	2,532	12

[a] Juneau percentages for 1991 were calculated without including 803 chinook salmon taken in strata which were not sampled for coded wire tags.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

more dependent upon hatchery coho salmon than has the Juneau fishery. About 35% of the 1984-1998 Ketchikan harvest originated in hatcheries (Table 17). In 1999, both the estimated hatchery harvest (6,843) and the hatchery contribution percent (33%) were slightly below average in Ketchikan. The contribution of hatchery-produced coho salmon to the Sitka fishery (19,772) was another record high and was also above average in terms of percent of harvest (27%).

BOTTOMFISH FISHERIES

The 1999 harvest of Pacific halibut in the Juneau fishery (8,104) was 28% below the 1983–1998 average of 11,333 (Table 18). The Ketchikan halibut harvest (5,126) was 50% below the 1984–1998 average of 10,172 and a new record low. As with angler effort, this low estimate was in part due to the failure to sample Clover Pass. Total estimated catches of Pacific halibut in the Juneau and Ketchikan fisheries were also well below average. The retention rate of 73% for Pacific halibut in Juneau was above the average of 71%, and the retention rate in Ketchikan (84%) was above the 1984–98 average of 79%. The Sitka harvest of Pacific halibut in 1999 (27,967) was 109% above the average harvest of 13,372 and 28% higher than the 1997 record. The retention rate of 67% in 1999 was about average.

Rockfish harvest in the 1999 Ketchikan fishery (3,282) was 66% below the 1984–98 average of 9,675 (Table 19). Retention of rockfish at 40% was below the 1986–1998 average of 45%. Targeted and non-targeted HPUE and CPUE for rockfish were both below average, continuing a trend of declining rockfish catch rates.

SHELLFISH FISHERIES

Shellfish harvests in the Juneau and Ketchikan areas have been estimated with creel surveys since 1988 (Table 20). In 1999, the estimated shellfish effort of 5,130 boat-days in the Juneau area was above average, as was the harvest of 7,339 king crab. However, the Dungeness crab harvest was the lowest on record and the Tanner crab harvest was below average. In Ketchikan,

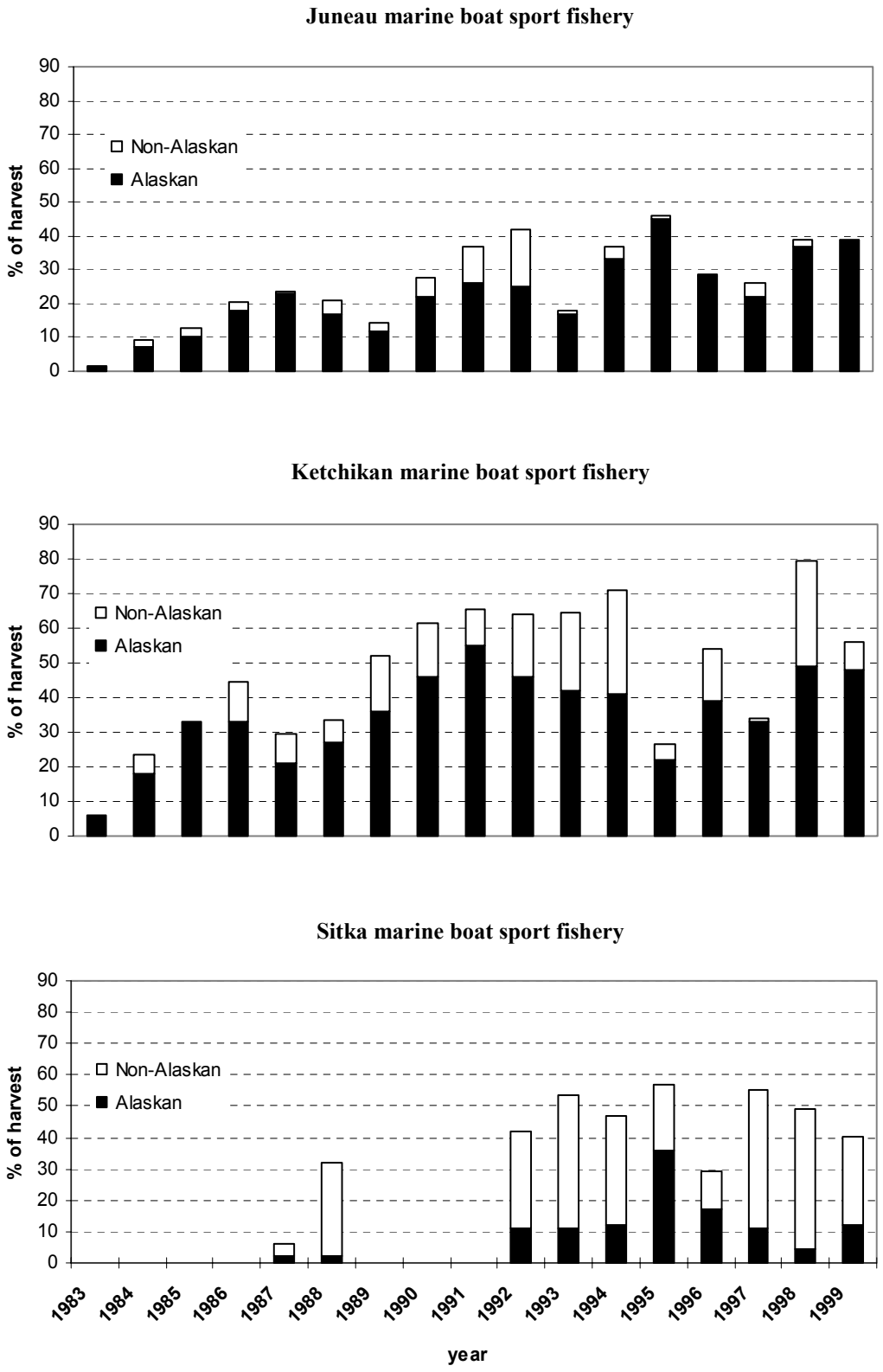


Figure 4.–Estimated contributions of hatchery-produced chinook salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys.

Table 16.–Estimated harvest of coho salmon, 1983–1999, in the Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys for comparable sample periods.

Year	Juneau marine[a]	Juneau Golden North Derby	Ketchikan marine[b]	Sitka marine
1983	12,662	2,964	---	
1984	10,100	1,594	14,231	
1985	17,138	2,919	---	
1986	9,763	367	20,814	
1987	17,610	3,056	10,464	1,185
1988	12,017	1,453	5,525	616
1989	23,819	3,173	10,781	
1990	26,343	1,914	33,661	
1991	22,379	2,567	43,789	
1992	18,482	2,166	22,688	4,336
1993	15,921	2,031	18,703	14,166
1994	62,218	8,358	44,673	23,080
1995	15,172	2,914	19,165	12,015
1996	18,816	4,505	42,220	28,981
1997	12,477	1,919	14,204	30,789
1998	15,730	4,419	24,059	42,524
Average	19,415	2,895	23,213	17,521
1999	26,604	4,324	20,719	73,757
% of average	137	149	89	421

[a] Includes Juneau Golden North Salmon Derby harvest.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled in 1997, 1998, or 1999.

Table 17.–Estimated contributions of hatchery-produced coho salmon to Juneau, Ketchikan, and Sitka marine boat sport fisheries as determined by onsite creel surveys, 1983–1999.

	Juneau marine		Ketchikan marine[b]		Sitka marine	
Year	Total	% of harvest	Total	% of harvest	Total	% of harvest
1983	227	2				
1984	52	1	5,181	36		
1985	1,353	8				
1986	37	< 1	3,200	15		
1987	94	1	4,663	45	57	5
1988	262	2	292	5	218	35
1989	930	4	1,147	11		
1990	482	2	9,515	28		
1991[a]	2,526	12	18,627	43		
1992	905	5	9,588	42	1,264	29
1993	1,577	10	4,325	23	1,650	12
1994	8,260	13	14,491	32	4,773	21
1995	1,010	7	7,327	38	2,270	19
1996	3,276	17	16,841	40	5,224	18
1997	2,162	17	5,822	41	4,798	16
1998	3,597	23	12,455	52	8,906	21
Average	1,672	9	8,105	35	3,240	18
1999	5,306	20	6,843	33	19,772	27

[a] Juneau percentages for 1991 were calculated without including 1,111 coho salmon taken in strata which were not sampled for coded wire tags.

[b] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled in 1997, 1998, or 1999.

Table 18.–Estimated harvest and catch of Pacific halibut in the Juneau, Ketchikan, and Sitka marine boat sport fisheries, 1983–1999.

	Juneau marine				Ketchikan marine				Sitka marine			
Year	Kept	Released	Total catch	Percent retained	Kept	Released	Total catch	Percent retained	Kept	Released	Total catch	Percent retained
1983	16,414	4,674	21,088	78								
1984	14,609	9,100	23,709	62	8,913	748	9,661	92				
1985	11,931	3,955	15,886	75								
1986	13,132	6,868	20,000	66	8,208	1,577	9,785	84				
1987	13,513	10,357	23,870	57	10,493	3,390	13,883	76	8,314	7,214	15,528	54
1988	12,672	5,027	17,699	72	7,317	1,338	8,655	85	6,923	5,962	12,885	54
1989	12,484	2,406	14,890	84	10,797	1,256	12,053	90				
1990	11,774	4,018	15,792	75	7,419	1,281	8,700	85				
1991	8,611	2,363	10,974	78	9,650	1,125	10,775	90				
1992	9,265	2,554	11,819	78	10,257	2,582	12,839	80	12,549	3,927	16,476	76
1993	6,928	2,652	9,580	72	12,783	4,443	17,226	74	12,720	4,289	17,009	75
1994	8,843	4,047	12,890	69	10,960	2,849	13,809	79	13,185	5,233	18,418	72
1995	9,252	3,234	12,486	74	19,675	7,089	26,764	74	13,151	5,963	19,114	69
1996	11,158	3,183	14,341	78	11,177	4,052	15,229	73	12,015	5,859	17,874	67
1997[a]	12,547	5,701	18,248	69	7,983	3,566	11,549	69	21,852	13,518	35,370	62
1998[a]	8,200	2,198	10,398	79	6,778	2,335	9,113	74	19,640	9,704	29,344	67
Average	11,333	4,521	15,854	71	10,172	2,688	12,860	79	13,372	6,852	20,224	66
1999[a]	8,104	2,985	11,090	73	5,126	961	6,087	84	27,967	13,580	41,547	67
% of average	72	66	70		50	36	47		209	198	205	

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 19.–Comparative effort and catch statistics for the Ketchikan rockfish sport fishery, 1984–1999.

		Angler effort		Total rockfish harvest and catch				Harvest per unit effort		Catch per unit effort	
Year	Survey dates	Total angler-hours	Bottomfish-hours	Harvest	Released	Total catch	% retained	Targeted[a]	Non-Targeted[b]	Targeted[c]	Non-targeted[d]
1984	4/29–9/29	223,725	62,625	9,805	---	---	---	0.16	0.04	---	---
1985[e]	4/15–6/30	---	---	---	---	---	---	---	---	---	---
1986	4/28–9/28	184,726	51,208	6,017	7,527	13,544	44	0.12	0.03	0.54	0.19
1987	4/20–9/27	242,274	84,954	18,591	27,539	46,130	40	0.22	0.08	0.26	0.07
1988	4/11–9/25	225,779	71,611	17,477	15,516	32,993	53	0.24	0.08	0.46	0.15
1989	4/24–9/24	276,516	79,958	11,224	6,742	17,966	62	0.14	0.04	0.22	0.06
1990	5/07–9/23	248,618	49,347	9,561	9,132	18,693	51	0.19	0.04	0.38	0.08
1991	4/29–9/29	343,698	67,842	12,442	10,714	23,156	54	0.18	0.04	0.34	0.07
1992	4/27–9/27	261,635	69,366	8,149	15,272	23,424	35	0.12	0.03	0.34	0.09
1993	4/26–9/26	276,969	78,002	10,573	15,192	25,765	41	0.14	0.04	0.33	0.09
1994	4/25–9/25	286,464	56,092	5,604	8,283	13,887	40	0.10	0.02	0.25	0.05
1995	4/24–9/24	277,146	101,381	10,132	13,015	23,147	44	0.10	0.04	0.23	0.08
1996	5/06–10/06	253,977	62,673	5,492	7,401	12,893	43	0.09	0.02	0.21	0.05
1997[f]	4/28–9/28	199,977	55,242	6,514	9,806	16,320	40	0.12	0.03	0.30	0.08
1998[f]	4/27-9/27	205,063	41,194	3,864	6,964	10,828	36	0.09	0.02	0.26	0.05
Average		250,469	66,535	9,675	11,777	21,442	45	0.14	0.04	0.32	0.09
1999[f]	4/26-9/26	169,664	33,359	3,282	4,838	8,120	40	0.10	0.02	0.24	0.05
% of average		68	50	34	41	38		70	51	76	59

[a] Rockfish harvest per bottomfish-hour of effort.

[b] Rockfish harvest per angler-hour of effort.

[c] Rockfish total catch per bottomfish-hour of effort.

[d] Rockfish total catch per angler-hour of effort.

[e] Data in 1985 are not comparable because the creel survey lasted only through 30 June, instead of late September.

[f] Total effort, harvest, and catch estimates are biased low because a major access site (Clover Pass) was not sampled.

Table 20.–Comparison of estimated shellfish effort and harvest for the Juneau and Ketchikan marine boat fisheries, 1988–1999.

JUNEAU FISHERY

Year	Effort (boat-days)	Dungeness crab harvest	Tanner crab harvest	King crab harvest	Shrimp harvest
1988	2,287	6,459	3,042	552	—
1989	2,652	8,356	3,369	1,849	—
1990	2,622	6,289	1,883	1,960	—
1991	3,812	13,433	1,294	2,467	—
1992	5,411	12,675	1,034	5,673	—
1993	6,013	11,980	1,557	8,963	—
1994	5,486	6,786	2,328	5,925	—
1995	5,161	10,460	2,161	4,598	—
1996	5,036	15,605	2,134	4,826	—
1997	5,382	12,440	1,348	4,839	—
1998	5,551	8,112	768	5,310	—
Average	4,492	10,236	1,902	4,269	—
1999	5,130	5,599	1,773	7,339	—

KETCHIKAN FISHERY[a]

Year	Effort (boat-days)	Dungeness crab harvest	Tanner crab harvest	King crab Harvest	Shrimp harvest
1988	1,398	9,043	0	0	27,643
1989	508	2,688	100	0	12,730
1990	614	3,367	0	0	17,130
1991	1,394	7,631	0	0	69,450
1992	1,387	10,227	0	0	130,720
1993	1,973	8,897	0	0	37,060
1994	1,439	7,032	0	0	34,580
1995	2,590	14,258	0	0	164,390
1996	1,255	5,528	0	0	76,840
1997	1,566	6,224	0	0	51,150
1998	743	4,190	210	0	99,680
Average	1,352	7,190	28	0	65,579
1999	1,211	4,959	0	0	57,920

[a] Ketchikan estimates are biased low in 1997, 1998, and 1999 because a major access site (Clover Pass) was not sampled.

shellfish effort of 1,211 boat-days was similar to the average of 1,352 boat-days. Dungeness crab harvest in Ketchikan of 4,959 was below the average of 7,190. Shrimp harvest in the Ketchikan area during 1999 (57,920) was also below average.

CONCLUSIONS AND RECOMMENDATIONS

The primary goals of this project to estimate harvest and Alaska hatchery contributions of chinook salmon in selected sport fisheries of Southeast Alaska, with specified levels of precision, were obtained.

Many changes have occurred in Southeast Alaska marine boat sport fisheries over the past decade. While the monitored Juneau and Ketchikan sport fisheries have declined a bit in the last few years, the Sitka fishery has grown greatly. Due in part to its location near fish migration corridors for abundant stocks, sport harvests of chinook salmon, coho salmon, and Pacific halibut in the Sitka fishery were again the largest in the region during 1999. It is expected that this growth in the Sitka fishery will continue as tourism increases in Southeast Alaska.

Wild stocks of fish have historically supported most of the sport fisheries, but increasing enhancement efforts have led to increased harvests of hatchery chinook and coho salmon. In 1999, the contributions of hatchery chinook and coho salmon to the Ketchikan fishery were 56% and 33%, respectively. During 1999, about 23% of the chinook salmon and 26% of the coho salmon taken in the combined Ketchikan, Sitka, and Juneau marine fisheries originated in Alaska hatcheries. An additional 19% of the chinook harvest originated in non-Alaskan hatcheries. These enhancement efforts are costly, and catch monitoring through the use of onsite survey programs is the primary means to evaluate and document the success of hatchery programs in producing fish for sport anglers.

Wild stock evaluation programs, which include coded wire tagging of both chinook and coho salmon, have been implemented in Southeast Alaska, and others are being planned. Tag recoveries from the sport fisheries are necessary to improve knowledge of wild stock contributions to the fisheries. It is recommended that onsite creel surveys and catch sampling programs of marine boat sport fisheries be continued in order to both evaluate the effectiveness of stocking programs and to provide information about wild stock composition.

In March of 1992, the Alaska Board of Fisheries allocated the Southeast Alaska chinook salmon quota, established under the U.S./Canada Pacific Salmon Treaty, between commercial and sport fisheries. The board also adopted a management plan for the chinook salmon sport fishery, which requires inseason management by ADF&G to ensure the sport fishery does not exceed its allocation. In 1999, sampling of all major boat sport fisheries, including those in Ketchikan, Juneau, and Sitka, was necessary in order to estimate the total Southeast Alaska sport harvest of chinook salmon so the sport fishery could be effectively managed. These sampling efforts, along with coded wire tag sampling programs in Craig/Klawock, Petersburg, and Wrangell, were also necessary to better document harvests of Alaska hatchery fish for catch reporting required by the Pacific Salmon Treaty. We recommend continuation of this expanded program.

Data from marine boat surveys are also used for many other purposes, including preparation of public information documents and position statements on proposed regulation changes. It is recommended that collection of current data on sport fisheries for coho salmon, Pacific halibut, rockfish, and lingcod be continued in order to improve management of these species.

It is also recommended that estimation of the shellfish harvest as a component of the marine harvest studies be continued, to provide information for evaluating the performance of this fishery and for addressing potential regulation changes during Alaska Board of Fisheries meetings.

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APPENDIX A: DATA ANALYSIS PROCEDURES

Appendix A1.–Data analysis procedures for angler effort, catch, and harvest estimates for the Sitka marine boat sport fishery during 1999.

Standard procedures were used to calculate estimates of angler effort, and catch and harvest by species for the survey at Sitka. The standard equations for a stratified four-stage random sample survey with locations, days, periods, and boat-parties were used for the Sitka survey to obtain point estimates as well as variance estimates.

First, the mean harvest of each species was obtained over all boat-parties interviewed during each sampled period for a sampled day at an access location:

$$\overline{n}_{hjio} = \frac{\sum_{k=1}^{m_{hjio}} n_{hjiok}}{m_{hjio}} \tag{A1.1}$$

where n_{hjiok} is the number of fish harvested by interviewed boat-party k during period o during sampled day i at access location j within stratum h; and m_{hjio} equals the number of interviewed boat-parties during each sample.

Then the mean estimate was expanded over all counted boat-parties to obtain the harvest estimate for each sample:

$$\hat{N}_{hjio} = M_{hjio}\ \overline{n}_{hjio} \tag{A1.2}$$

where M_{hjio} equals the number of boat-parties counted within each sample.

Then, the mean harvest by species was obtained over all periods sampled for the sampled day at each access location:

$$\overline{\hat{N}}_{hji} = \frac{\sum_{o=1}^{p_{hji}} \hat{N}_{hjio}}{p_{hji}} \tag{A1.3}$$

where p_{hji} is the number of periods sampled within each sampled day.

Then this mean was expanded over all periods at each location to obtain the harvest estimate for the day at each access location:

$$\hat{N}_{hji} = P_{hji}\,\overline{\hat{N}}_{hji} \tag{A1.4}$$

where P_{hji} equals the number of periods within the sampling day.

Next the mean harvest over all days sampled at each access location was obtained:

$$\overline{\hat{N}}_{hj} = \frac{\sum_{i=1}^{d_{hj}} \hat{N}_{hji}}{d_{hj}} \tag{A1.5}$$

where d_{hj} equals the days sampled for access location j.

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The estimated harvest for the sampled access location within each stratum was obtained by expanding by the number of days:

$$\hat{N}_{hj} = D_{hj}\overline{\hat{N}}_{hj} \tag{A1.6}$$

where D_{hj} equals the total number of possible days available for sampling.

Then the stratum mean harvest over all sampled access locations was obtained:

$$\overline{\hat{N}}_h = \frac{\sum_{j=1}^{q_h} \hat{N}_{hj}}{q_h} \tag{A1.7}$$

where q_h equals the number of access locations sampled within each stratum.

Finally, the estimated harvest for each stratum was obtained by expanding for access locations:

$$\hat{N}_h = Q_h\overline{\hat{N}}_h \tag{A1.8}$$

where Q_h equaled the total number of access locations in each stratum.

Estimates of catch of each species were calculated similarly by substituting the appropriate catch statistics for each species into equations (A1.1) through (A1.8), above. Similarly, the angler effort estimate was calculated by substitution.

The variance of the stratum estimates of harvest was obtained using the standard four-stage equation (adapted from Cochran 1977):

$$\begin{aligned}\hat{V}\left[\hat{N}_h\right] = &\left\{(1-f_{1h})Q_h^2\frac{S_{1h}^2}{q_h}\right\} + \left\{f_{1h}\frac{Q_h^2}{q_h q_h^{'}}\sum_{j=1}^{q_h^{'}}(1-f_{2hj})D_{hj}^2\frac{S_{2hj}^2}{d_{hj}}\right\} \\ &+ \left\{f_{1h}\frac{Q_h^2}{q_h^2}\sum_{j=1}^{q_h} f_{2hj}\frac{D_{hj}^2}{d_{hj}d_{hj}^{'}}\sum_{i=1}^{d_{hj}^{'}}(1-f_{3hji})P_{hji}^2\frac{S_{3hji}^2}{p_{hji}}\right\} \\ &+ \left\{f_{1h}\frac{Q_h^2}{q_h^2}\sum_{j=1}^{q_h} f_{2hj}\frac{D_{hj}^2}{d_{hj}^2}\sum_{i=1}^{d_{hj}} f_{3hji}\frac{P_{hji}^2}{p_{hji}p_{hji}^{'}}\sum_{o=1}^{p_{hji}^{'}}(1-f_{4hjio})M_{hjio}^2\frac{s_{4hjio}^2}{m_{hjio}}\right\}\end{aligned} \tag{A1.9}$$

where f_{1h}, f_{2hj}, f_{3hji}, and f_{4hjio} are the sampling fractions for access locations, days, sampling periods, and boat-parties respectively (i.e., $f_{1h} = q_h/Q_h$; $f_{2hj} = d_{hj}/D_{hj}$; $f_{3hji} = p_{hji}/P_{hji}$; $f_{4hjio} = m_{hjio}/M_{hjio}$); S_{1h}^2 equals the among access location variance component for the angler harvest estimate, which was calculated as

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$$S_{1h}^2 = \frac{\sum_{j=1}^{q_h}\left(\hat{N}_{hj} - \overline{\hat{N}}_h\right)^2}{q_h - 1} \tag{A1.10}$$

S_{2hj}^2 equals the among day (within access location) variance component for the harvest estimate, obtained as

$$S_{2hj}^2 = \frac{\sum_{i=1}^{d_{hj}}\left(\hat{N}_{hji} - \overline{\hat{N}}_{hj}\right)^2}{d_{hj} - 1} \tag{A1.11}$$

q_h' is the number of access locations sampled in which S_{2hj}^2 can be estimated (i.e., in which at least two days sampled); S_{3hji}^2 equals the among sampling period variance component for the harvest estimate, obtained as

$$S_{3hji}^2 = \frac{\sum_{o=1}^{p_{hji}}\left(\hat{N}_{hjio} - \overline{\hat{N}}_{hji}\right)^2}{p_{hji} - 1} \tag{A1.12}$$

d_{hj}' is the number of days sampled in which S_{3hji}^2 can be estimated (i.e., in which at least two periods are sampled or fewer than two periods are available for sampling by definition); s_{4hjio}^2 equals the among boat-party variance component for the harvest estimate, obtained as

$$s_{4hjio}^2 = \frac{\sum_{k=1}^{m_{hjio}}\left(n_{hjiok} - \overline{n}_{hjio}\right)^2}{m_{hjio} - 1} \tag{A1.13}$$

p_{hji}' is the number of periods in which s_{4hjio}^2 can be estimated [i.e., either (1) at least two boat-parties interviewed or (2) the number of boat-parties interviewed equals the number of exiting boat-parties: $m_{hjio} = M_{hjio}$].

Variances of the stratum estimates of catch by species and angler effort were obtained similarly, by substituting the appropriate catch and effort statistics into equations (A1.9) to (A1.13), above.

In applying these procedures for some of the strata (for example during the derby at Sitka), only one period is defined within a sampling day. The sampling day in these surveys is completely covered during any sample. Accordingly, $p_{hji} = P_{hji} = 1$, and $f_{3hji} = 1$, and as such, the third-stage variance term in equation (A1.9) equals zero.

Similarly, in applying these procedures to some strata, only one location is defined. Accordingly, $q_h = Q_h = 1$, and $f_{1h} = 1$, and as such, the first-stage variance term equals zero. Also note that during

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many of the derby strata, each derby day is defined as a separate stratum, so that $d_{hj} = D_{hj} = 1$, and $f_{2hj} = 1$, and as such the second-stage variance term equals zero. Finally, during many samples, all exiting boat-parties were interviewed, so that $m_{hjio} = M_{hjio}$ and $f_{4hjio} = 1$, and as such, the fourth-stage variance term equals zero.

Estimates of angler effort, catch and harvest by species and their variances across all strata, or select combinations of strata, were obtained by summing individual stratum estimates (assuming independence). Standard errors of the strata and total estimates were obtained simply by taking the square root of the appropriate variance estimate.

Appendix A2.–Data analysis procedures for angler effort, catch, and harvest estimates for the Ketchikan and Juneau marine boat sport fisheries during 1999.

Estimates of angler effort, and catch and harvest by species for the surveys conducted at Juneau and Ketchikan were obtained by the procedures appropriate to a stratified three-stage random sample survey with days, locations, and boat-parties as sampling units. First, the mean harvest of each species was calculated over all boat-parties interviewed at each sampled access location within each sampled day:

$$\overline{n}_{hij} = \frac{\sum_{k=1}^{m_{hij}} n_{hijk}}{m_{hij}} \tag{A2.1}$$

where n_{hijk} is the number of fish harvested by interviewed boat-party k at access location j during sampled day i within stratum h; and m_{hij} equals the number of interviewed boat-parties during each sample.

Then the mean estimate was expanded over all counted boat-parties to obtain the harvest estimate for each sampled location within a day:

$$\hat{N}_{hij} = M_{hij}\overline{n}_{hij} \tag{A2.2}$$

where M_{hij} equals the number of boat-parties counted within each sample.

Then, the mean harvest by species was obtained over all periods sampled at each access location within each sampled day:

$$\overline{\hat{N}}_{hi} = \frac{\sum_{j=1}^{q_{hi}} \hat{N}_{hij}}{q_{hi}} \tag{A2.3}$$

where q_{hi} equals the number of access locations sampled during sampled day i.

The estimated harvest for the sampled day within each stratum was then obtained by expanding by the number of access locations:

$$\hat{N}_{hi} = Q_{hi}\overline{\hat{N}}_{hi} \tag{A2.4}$$

where Q_{hi} equals the total number of possible access locations available for sampling.

Then the stratum mean daily harvest was calculated :

$$\overline{\hat{N}}_{h} = \frac{\sum_{i=1}^{d_h} \hat{N}_{hi}}{d_h} \tag{A2.5}$$

where d_h equals the number of days sampled within each stratum.

Finally, the estimated harvest for each stratum was obtained by expanding for days:

$$\hat{N}_{h} = D_h\overline{\hat{N}}_{h} \tag{A2.6}$$

where D_h equals the total number of days in each stratum.

Estimates of catch of each species were obtained similarly by substituting the appropriate catch statistics for each species into equations (A2.1) through (A2.6), above. Similarly, the angler effort estimate was calculated by substitution.

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The variance of the stratum estimates of harvest were obtained using the three-stage equation (adapted from Cochran 1977):

$$\hat{V}\left[\hat{N}_h\right] = \left\{\left(1 - f_{1h}\right)D_h^2 \frac{S_{1h}^2}{d_h}\right\} + \left\{f_{1h} \frac{D_h^2}{d_h d_h^{'}} \sum_{i=1}^{d_h^{'}} \left(1 - f_{2hi}\right) Q_{hi}^2 \frac{S_{2hi}^2}{q_{hi}}\right\} + \left\{f_{1h} \frac{D_h^2}{d_h^2} \sum_{i=1}^{d_h} f_{2hi} \frac{Q_{hi}^2}{q_{hi} q_{hi}^{'}} \sum_{j=1}^{q_{hi}^{'}} \left(1 - f_{3hij}\right) M_{hij}^2 \frac{s_{3hij}^2}{m_{hij}}\right\} \quad \text{(A2.7)}$$

where f_{1h}, f_{2hi}, and f_{3hij} are the sampling fractions for days, access locations, and boat-parties, respectively (i.e., $f_{1h} = d_h / D_h$; $f_{2hi} = q_{hi} / Q_{hi}$; $f_{3hij} = m_{hij} / M_{hij}$),

S_{1h}^2 equals the among day variance component for the angler harvest estimate, obtained as

$$S_{1h}^2 = \frac{\sum_{i=1}^{d_h} \left(\hat{N}_{hi} - \overline{\hat{N}}_h\right)^2}{d_h - 1} \quad \text{(A2.8)}$$

S_{2hi}^2 equals the among access location (within day) variance component for the harvest estimate, obtained as

$$S_{2hi}^2 = \frac{\sum_{j=1}^{q_{hi}} \left(\hat{N}_{hij} - \overline{\hat{N}}_{hi}\right)^2}{q_{hi} - 1} \quad \text{(A2.9)}$$

$d_h^{'}$ is the number of days in which S_{2hi}^2 can be estimated (i.e., days with at least two locations sampled); s_{3hij}^2 equaled the among boat-party variance component for the harvest estimate, obtained as

$$s_{3hij}^2 = \frac{\sum_{k=1}^{m_{hij}} \left(n_{hijk} - \overline{n}_{hij}\right)^2}{m_{hij} - 1} \quad \text{(A2.10)}$$

and $q_{hi}^{'}$ is the number of locations in which s_{3hij}^2 can be estimated (i.e., locations with either (1) at least two boat-parties interviewed, or (2) the number of boat-parties interviewed equals the number of exiting boat-parties: $m_{hij} = M_{hij}$).

Variances of the stratum estimates of catch by species and angler effort were obtained similarly, by substituting the appropriate catch and effort statistics into equations (A2.7) through (A2.10), above.

Estimates of angler effort, catch and harvest by species and their variances across all strata, or select combinations of strata were calculated by summing the individual stratum estimates (assuming independence). Standard errors of the strata and total estimates were obtained simply by taking the square root of the appropriate variance estimate.

Appendix A3.–Data analysis procedures for coho salmon harvest per unit effort estimates for the Ketchikan, Juneau, and Sitka marine boat sport fishery surveys during 1999.

Harvest per unit effort (HPUE) in terms of coho salmon harvested per angler-hour of effort was estimated for the Juneau, Ketchikan, and Sitka surveys by the following procedures for each biweek. The estimates of HPUE were obtained from unweighted means as follows, by first obtaining the mean HPUE for all anglers in each interviewed boat-party:

$$\overline{HPUE}_{hijk} = \frac{n_{hijk}}{e_{hijk} v_{hijk}} \tag{A3.1}$$

where n_{hijk} equaled the entire harvest of the interviewed boat-party k, from the sample at access location j, during day i within stratum h; e_{hijk} was the effort (in boat-hours) of each interviewed boat-party; and v_{hijk} was the number of anglers in the interviewed boat-party.

The mean HPUE for the biweek was obtained over all boat-parties interviewed within each biweek:

$$\overset{\wedge}{HPUE} = \frac{\sum_{h=1}^{s} \sum_{i=1}^{d_h} \sum_{j=1}^{q_{hi}} \sum_{k=1}^{m_{hij}} \overline{HPUE}_{hijk}}{m} \tag{A3.2}$$

where m_{hij} equaled the number of boat-parties interviewed; q_{hi} equaled the number of access locations sampled during each day; d_h equaled the number of days sampled within each stratum; s equaled the number of strata within each biweekly period; and m equaled all boat-parties interviewed within a biweekly period, obtained as

$$m = \sum_{h=1}^{s} \sum_{i=1}^{d_h} \sum_{j=1}^{q_{hi}} m_{hij} \tag{A3.3}$$

The variances of the biweekly estimates of HPUE were obtained by the following equation:

$$\hat{V}\left[\overset{\wedge}{HPUE}\right] = \frac{\sum_{h=1}^{s} \sum_{i=1}^{d_h} \sum_{j=1}^{q_{hi}} \sum_{k=1}^{m_{hij}} \left(\overline{HPUE}_{hijk} - \overset{\wedge}{HPUE}\right)^2}{m\,(m-1)} \tag{A3.4}$$

Standard errors were obtained by taking the square root of the variance estimates.

Appendix A4.–Data analysis procedures for hatchery and tagged wild stock contributions to marine boat sport fisheries during 1999.

Hatchery contributions were estimated for the surveys using procedures outlined by Bernard and Clark (1996). Estimates were obtained on a biweekly basis, treating all strata within each biweek equally. As such, the relative contributions of the Alaskan hatchery releases of interest were assumed to be consistent from one sampling stratum (except for derby strata) to the next within any biweekly period. Considering that anglers in general fished the same stocks of fish, regardless of access location used within each survey, then this assumption should be valid. Estimating procedures used (Bernard and Clark 1996) are those appropriate for estimating contributions and variances when total harvest is estimated.

The notation used in the following equations essentially follows that used by Bernard and Clark (1996), with subscripts adapted to avoid confusion with other subscripts used in this report. The first step involved estimating the contribution to each biweekly period in the fishery of each particular tag code:

$$\hat{r}_{tc} = \hat{N}_t \hat{p}_{tc} \theta_c^{-1} \tag{A4.1}$$

where $\hat{r}_{tc}$ equals the estimated number of salmon from a hatchery release identified by the unique tag code c, harvested in biweek t; $\hat{N}_t$ is the estimated total harvest of salmon (one particular species only) for biweek t; θ_c is the proportion of a particular hatchery release which contained a coded wire tag of the unique tag code c; $\hat{p}_{tc}$ which was calculated as

$$\hat{p}_{tc} = \frac{m_{tc}}{\lambda_t n_t} \tag{A4.2}$$

n_t is number of salmon (one particular species only) inspected for missing adipose fins from the sampled harvest in biweek t; m_{tc} equals the number of coded wire tags dissected out of the salmon heads and decoded as the unique tag code c, originally sampled from biweek t; λ_t is defined as

$$\lambda_t = \frac{a_t' t_t'}{a_t t_t} \tag{A4.3}$$

a_t is the number of salmon with a missing adipose fin from the n_t sampled harvest in biweek t; a_t' equals the number of salmon heads previously marked with a head strap which arrived at the tag lab, from fish originally sampled from biweek t; t_t is the number of coded wire tags which were detected in the salmon heads at the tag lab, from those salmon sampled in biweek t; t_t' equals the number of coded wire tags which were removed from the salmon heads and decoded, from those salmon sampled in biweek t.

Estimates of across biweek contributions by tag code, as well as by combined tag codes (e.g., all Alaskan hatchery tag codes), were obtained by summing the estimates across biweeks and tag codes, as appropriate:

$$\hat{R} = \sum_t \sum_c \hat{r}_{tc} \tag{A4.4}$$

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Estimates of the variance for contributions in a biweekly period were estimated following the approach outlined by Bernard and Clark (1996):

$$\hat{V}\left[\hat{r}_{tc}\right] = \hat{r}_{tc}^2\left\{\frac{\hat{V}\left[\hat{p}_{tc}\right]}{\hat{p}_{tc}^2} + \frac{\hat{V}\left[\hat{N}_t\right]}{\hat{N}_t^2} - \frac{\hat{V}\left[\hat{p}_{tc}\right]\hat{V}\left[\hat{N}_t\right]}{\hat{p}_{tc}^2\hat{N}_t^2}\right\} \tag{A4.5}$$

where $\hat{V}\left[\hat{N}_t\right]$equals the estimated variance of overall harvest estimate for biweek *t*, obtained from the harvest sampling program; and $\hat{V}\left[\hat{p}_{tc}\right]$ is the variance of $\hat{p}_{tc}$ which was estimated following the large-sample approximation approach proposed by Bernard and Clark (1996; their equation 12):

$$\hat{V}\left[\hat{p}_{tc}\right] \approx \left(\frac{\hat{p}_{tc}}{\lambda_t n_t}\right)\left(1 - \lambda_t\hat{\phi}_t\theta_c\right) \tag{A4.6}$$

where $\hat{\phi}_t = n_t / \hat{N}_t$.

Estimates of the variance of across biweek contributions by tag code, as well as by combined tag codes, were obtained by the following equation (adapted from equation 3 in Bernard and Clark, 1996):

$$\hat{V}\left[\hat{R}\right] = \sum_t\sum_c \hat{V}\left[\hat{r}_{tc}\right] + 2\sum_t\sum_c\sum_{u>c} \hat{Cov}\left[\hat{r}_{tc}, \hat{r}_{tu}\right] \tag{A4.7}$$

where $\hat{Cov}\left[\hat{r}_{tc}, \hat{r}_{tu}\right]$ is the covariance between the estimated contribution of two different tag codes within one biweekly period, which is calculated using the large-sample approximation of Bernard and Clark (1996); their equation (14):

$$\hat{Cov}\left[\hat{r}_{tc}, \hat{r}_{tu}\right] \approx \hat{r}_{tc}\hat{r}_{tu}\left(\frac{\hat{V}\left[\hat{N}_t\right]}{\hat{N}_t^2}\right) \tag{A4.8}$$

Standard errors (SEs) were obtained as the square root of the appropriate variance.

Estimates of relative contribution by coded wire tag code for Alaskan hatchery fish (denoted below by the term $\hat{u}_c$) for the Craig/Klawock, Petersburg, and Wrangell surveys were estimated by the approach outlined in Bernard and Clark (1996). Specifically, equation (A4.1) was adapted by dividing through by the unknown total harvest estimate ($\hat{N}$):

$$\hat{u}_c = \left(\frac{m_c}{\lambda n}\right)\theta_c^{-1} = \hat{p}_c\theta_c^{-1} \tag{A4.9}$$

where all terms are as defined above, without the biweek subscript, since estimates are calculated for the season as a whole.

The variance of $\hat{u}_c$ was calculated by

$$\hat{V}\left[\hat{u}_c\right] = V\left[\hat{p}_c\right]\theta_c^{-2} \tag{A4.10}$$

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The variance of $\hat{p}_c$ was calculated approximately (adapting equation [A4.6], above) as

$$\hat{V}\left[\hat{p}_c\right] \approx \frac{\hat{p}_c}{\lambda n} \tag{A4.11}$$

where all terms are as defined above without the biweek subscript. Note that $\hat{V}\left[\hat{u}_c\right] > V\left[\hat{u}_c\right]$ by a factor of $(1 - \lambda\phi\theta_c)$ where $\phi = n/N$. If the product $\lambda\phi\theta_c$ is negligible, $\hat{V}\left[\hat{u}_c\right] = V\left[\hat{u}_c\right]$. If the product $\lambda\phi\theta_c$ is not negligible, $\hat{V}\left[\hat{u}_c\right](1 - \lambda\phi\theta_c) = V\left[\hat{u}_c\right]$. Substitution of $\hat{\phi}$ for ϕ would produce $\hat{V}\left[\hat{u}_c\right](1 - \lambda\hat{\phi}\theta_c) = V\left[\hat{u}_c\right]$.

Unbiased estimates of $\hat{u}_c$ were obtained only if the total harvest of each species of salmon is sampled proportionally throughout each of the harvest sampling surveys *or* the contributions do not vary within the season at each survey location.

Estimates of the contributions of tagged wild stocks of chinook and coho salmon were generated similarly when the tagging fraction, θ_C, was estimated by sampling returning adults on the spawning grounds to obtain the ratio of tagged adults to total adults sampled (McPherson et al. 1998).

APPENDIX B: CREEL SURVEY AND CATCH SAMPLING STATISTICS

Appendix B1.–Estimated effort, harvest, and total catches for the Ketchikan marine boat sport fishery, 26 April–26 September 1999.

	Estimate[a]	Standard Error	Relative Precision[b]
Finfish effort			
Boat-hours	62,303	3,687	10%
Salmon-hours	136,284	10,769	13%
Bottomfish-hours	33,359	2,865	14%
Angler-hours	169,664	11,469	11%
Boat-days	15,529	860	9%
Finfish harvests[c]			
Total chinook salmon ≥ 28”	4,494	509	19%
Derby take-home	82	15	4%
Derby entered	530	0	0%
Derby take-home & entered	612	15	4%
Total chinook salmon < 28”	320	97	50%
Coho salmon	20,719	2,335	19%
Pink salmon	21,460	2,972	23%
Chum salmon	350	61	29%
Sockeye salmon	22	9	67%
Pacific halibut	5,126	525	17%
Lingcod	296	55	31%
Total rockfish	3,282	347	17%
Quillback rockfish	602	136	37%
Dusky rockfish	86	21	40%
Copper rockfish	22	14	105%
Black rockfish	31	21	111%
Yelloweye rockfish	377	61	27%
Silvergrey rockfish	93	75	133%
Other pelagic rockfish	22	11	82%
Other non-pelagic rockfish	54	23	70%
Unidentified rockfish	1,998	307	25%
Finfish total catch[c]			
Chinook salmon ≥ 28”	4,803	553	19%
Chinook salmon < 28”	9,480	974	17%
Coho salmon	21,655	2,444	19%
Pink salmon	30,418	3,686	20%
Chum salmon	468	79	28%
Sockeye salmon	22	9	67%
Pacific halibut	6,087	634	17%
Lingcod	540	82	25%
Total rockfish	8,120	763	15%
Shellfish effort and harvest[c]			
Boat-days fished	1,211	182	25%
Pots or rings	3,195	539	28%
Crab boat-days fished	801	112	23%
Crab pots or rings	1,705	224	22%
Dungeness crab kept	4,959	660	22%
Shrimp kept	57,920	7,716	22%

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100.

[c] No cutthroat trout, steelhead, Dolly Varden, king crab or Tanner crab were caught or harvested.

Appendix B2.–Estimated effort, harvest, and total catches for the Juneau marine boat sport fishery, 26 April–26 September 1999.

	Estimate	Standard error	Relative Precision[a]
Finfish effort			
Boat-hours	121,524	5,900	8%
Salmon-hours	252,169	13,924	9%
Bottomfish-hours	63,578	5,146	13%
Angler-hours	316,442	17,261	9%
Boat-days	28,914	1,318	7%
Finfish harvests[b]			
Total chinook salmon ≥ 28”	5,639	411	12%
Derby take-home	109	27	41%
Derby entered	396	0	0%
Derby take-home & entered	505	27	9%
Total chinook salmon < 28”[c]	511	103	33%
Coho salmon	26,604	2,654	16%
Derby take-home	1,473	321	36%
Derby entered	2,851	0	0%
Derby take-home & entered	4,324	321	12%
Chum salmon	565	83	24%
Sockeye salmon	86	34	65%
Pink salmon	7,193	753	17%
Pacific halibut	8,105	808	16%
Total rockfish	1,056	171	27%
Lingcod	86	37	71%
Dolly Varden	347	70	33%
Finfish total catch[b]			
Chinook salmon ≥ 28”	5,949	430	12%
Chinook salmon < 28”	17,683	2,292	21%
Coho salmon	27,502	2,705	16%
Chum salmon	679	90	22%
Sockeye salmon	86	34	65%
Pink salmon	19,123	2,554	22%
Pacific halibut	11,090	1,106	16%
Total rockfish	1,197	185	25%
Lingcod	132	48	60%
Dolly Varden	1,250	602	79%
Shellfish effort and harvest			
Boat-days fished	5,130	320	10%
Pots or rings	9,252	592	11%
King crab boat-days fished	3,087	238	13%
King crab pots or rings	5,533	440	13%
King crab kept	7,339	679	15%
Dungeness crab kept	5,599	793	23%
Tanner crab kept	1,773	862	80%

[a] Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100.
[b] One steelhead was caught and released, and no cutthroat trout were caught or harvested.
[c] Includes one small chinook salmon (<28”) entered in the Derby.

Appendix B3.–Estimated effort, harvest, and total catches for the Sitka marine boat sport fishery, 26 April–26 September 1999.

	Estimate	Standard error	Relative precision[a]
Finfish effort			
Boat-hours	75,606	3,531	8%
Salmon-hours	168,793	8,515	8%
Bottomfish-hours	57,899	4,514	13%
Angler-hours	229,012	11,934	9%
Boat-days	20,274	1,022	8%
Finfish harvests[b]			
Total chinook salmon ≥ 28”	20,741	1,442	11%
Derby take-home	1,507	267	29%
Derby entered	637	0	0%
Derby take-home & entered	2,144	267	20%
Total chinook salmon < 28”	63	31	82%
Coho salmon	73,757	7,441	17%
Chum salmon	538	156	48%
Sockeye salmon	5,013	1,070	35%
Pink salmon	4,326	454	17%
Pacific halibut	27,967	2,672	16%
Lingcod	4,961	471	16%
Total rockfish	13,412	1,019	12%
Quillback rockfish	898	201	37%
Dusky rockfish	214	62	48%
Copper rockfish	110	30	45%
Black rockfish	4,597	547	20%
Yelloweye rockfish	6,232	722	19%
Silvergrey rockfish	134	39	48%
Other non-pelagic rockfish	941	179	31%
Unidentified rockfish	287	92	53%
Finfish total catch[b]			
Chinook salmon ≥ 28”	24,980	1,735	11%
Chinook salmon < 28”	1,663	175	17%
Coho salmon	76,422	7,570	16%
Sockeye salmon	5,120	1,082	35%
Chum salmon	653	176	44%
Pink salmon	9,609	981	17%
Pacific halibut	41,547	4,158	16%
Lingcod	5,665	497	14%
Total rockfish	31,455	1,930	10%

[a] Relative precision ($\alpha = 0.10$) = (SE * 1.645 / estimate) * 100.

[b] Seven Dolly Varden were harvested, and no steelhead or cutthroat trout were caught or harvested; shellfish effort, catch and harvest were not recorded.

Appendix B4.–Estimated effort, harvest and catch for the Ketchikan marine boat sport fishery by seasonal period, 26 April–26 September 1999[a].

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	307	22,362	415	83,892	126	4,452	541	93,720
10May-23May	1,645	215,291	3,508	1,811,017	901	111,802	4,429	2,212,147
Derby[b]	8,032	2,151,761	16,845	8,138,469	1,785	144,853	18,631	9,243,143
24May-06Jun	2,227	330,785	5,607	3,553,019	575	67,098	6,182	3,672,238
07Jun-20Jun	6,279	1,585,669	15,323	30,818,462	3,978	457,436	19,301	29,905,806
21Jun-04Jul	7,769	2,190,519	17,027	12,391,792	3,388	709,343	20,416	15,815,093
05Jul-18Jul	8,799	1,640,956	18,498	7,779,387	6,032	1,762,340	24,529	12,656,622
19Jul-01Aug	6,150	1,298,506	12,418	17,293,764	5,607	1,621,141	18,025	18,068,190
02Aug-15Aug	5,601	907,130	13,818	15,804,493	3,690	614,310	17,508	17,626,836
16Aug-29Aug	3,766	335,518	8,766	2,742,212	2,176	506,640	10,942	3,416,903
30Aug-12Sep	7,707	2,095,247	16,017	9,994,954	3,203	632,703	19,220	13,914,411
13Sep-26Sep	4,021	818,789	8,042	5,569,922	1,898	1,576,700	9,940	4,917,652
Total	62,303	13,592,533	136,284	115,981,383	33,359	8,208,818	169,664	131,542,761

Seasonal period	Boat-days		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	129	2,796	0	0	0	0	17	150
10May-23May	447	12,318	123	3,370	123	3,370	123	1,614
Derby	1,471	67,066	624	453	612	239	607	20,721
24May-06Jun	604	25,913	177	4,596	177	4,596	132	4,355
07Jun-20Jun	1,530	84,028	737	128,551	683	106,321	790	182,314
21Jun-04Jul	1,971	134,389	1,564	107,940	1,473	84,608	1,793	117,466
05Jul-18Jul	2,523	115,704	1,001	38,809	926	40,686	1,810	313,284
19Jul-01Aug	1,641	79,914	359	18,907	285	15,629	1,195	115,250
02Aug-15Aug	1,524	54,875	110	2,093	107	2,089	838	76,379
16Aug-29Aug	1,057	27,966	67	1,401	67	1,401	402	9,046
30Aug-12Sep	1,661	94,683	27	118	27	118	1,003	54,566
13Sep-26Sep	971	40,155	14	30	14	30	770	53,862
Total	15,529	739,807	4,803	306,268	4,494	259,087	9,480	949,007

Seasonal period	Chinook salmon < 28" harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	0	0
Derby	0	0	9	30	3	6	6	13
24May-06Jun	0	0	0	0	0	0	0	0
07Jun-20Jun	0	0	10	83	10	83	9	72
21Jun-04Jul	48	714	748	83,639	689	82,228	2,325	1,563,376
05Jul-18Jul	222	8,231	3,753	668,587	3,517	514,664	5,409	1,094,090
19Jul-01Aug	24	228	3,861	2,063,279	3,722	1,802,584	4,227	1,409,472
02Aug-15Aug	14	182	2,119	318,744	2,068	306,070	5,416	3,093,766
16Aug-29Aug	0	0	2,258	327,191	2,147	274,727	6,362	3,195,862
30Aug-12Sep	9	32	4,435	771,423	4,301	750,077	5,712	3,155,459
13Sep-26Sep	3	5	4,462	1,738,065	4,262	1,722,623	952	77,940
Total	320	9,392	21,655	5,971,041	20,719	5,453,062	30,418	13,590,050

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Seasonal period	Pink salmon harvested		Chum salmon total catch		Chum salmon Harvested		Sockeye salmon catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	0	0
Derby	0	0	29	115	17	34	0	0
24May-06Jun	0	0	0	0	0	0	0	0
07Jun-20Jun	0	0	27	648	0	0	0	0
21Jun-04Jul	1,826	1,081,751	22	99	17	83	0	0
05Jul-18Jul	4,025	513,863	133	3,369	121	2,354	5	22
19Jul-01Aug	3,324	1,117,668	92	811	78	535	4	9
02Aug-15Aug	4,240	2,701,253	77	559	64	558	5	17
16Aug-29Aug	5,068	2,391,358	15	41	12	32	5	17
30Aug-12Sep	2,780	1,020,385	53	457	27	57	3	7
13Sep-26Sep	197	7,134	20	65	14	29	0	0
Total	21,460	8,833,412	468	6,164	350	3,682	22	72

Seasonal period	Pacific halibut total catch		Pacific halibut harvested		Rockfish Total catch		Rockfish Harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	28	392	14	98	14	98	0	0
10May-23May	96	2,251	78	1,528	256	10,029	73	1,971
Derby	354	4,825	289	3,855	838	33,864	80	829
24May-06Jun	92	2,122	92	2,122	114	5,657	30	832
07Jun-20Jun	603	35,474	465	30,258	511	26,602	153	3,672
21Jun-04Jul	712	52,468	563	41,612	786	54,914	188	3,614
05Jul-18Jul	1,079	120,547	858	60,820	1,414	122,231	697	25,805
19Jul-01Aug	1,030	60,898	954	50,893	1,095	97,895	372	7,479
02Aug-15Aug	680	27,693	625	22,951	825	33,842	464	20,686
16Aug-29Aug	466	30,558	423	23,323	540	30,239	256	10,544
30Aug-12Sep	666	49,724	531	25,621	1,201	79,291	799	42,439
13Sep-26Sep	281	15,200	234	12,898	526	87,468	170	2,462
Total	6,087	402,152	5,126	275,979	8,120	582,130	3,282	120,333

Seasonal period	Lingcod total catch		Lingcod harvested		Quillback rockfish Harvested		Dusky rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	11	104	11	104	11	105	0	0
Derby	51	249	9	12	22	213	8	22
24May-06Jun	32	447	7	39	20	370	0	0
07Jun-20Jun	52	1,057	20	142	9	72	0	0
21Jun-04Jul	54	708	23	270	14	71	5	16
05Jul-18Jul	102	1,802	91	1,642	127	7,129	13	65
19Jul-01Aug	62	659	30	240	72	592	28	261
02Aug-15Aug	52	533	26	194	104	4,350	5	17
16Aug-29Aug	32	303	14	92	63	1,853	0	0
30Aug-12Sep	86	856	59	300	145	3,766	24	68
13Sep-26Sep	6	32	6	32	15	78	3	5
Total	540	6,750	296	3,067	602	18,599	86	454

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Seasonal period	Copper rockfish harvested		Black rockfish harvested		Other pelagic rockfish harvested		Yelloweye rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	28	450
Derby	0	0	0	0	0	0	11	22
24May-06Jun	0	0	0	0	0	0	10	92
07Jun-20Jun	0	0	0	0	0	0	0	0
21Jun-04Jul	0	0	5	16	0	0	18	81
05Jul-18Jul	0	0	0	0	0	0	53	305
19Jul-01Aug	0	0	0	0	7	35	72	417
02Aug-15Aug	14	154	23	428	0	0	23	63
16Aug-29Aug	0	0	0	0	0	0	29	362
30Aug-12Sep	0	0	3	7	15	91	86	1,494
13Sep-26Sep	8	45	0	0	0	0	47	480
Total	22	199	31	451	22	126	377	3,766

Seasonal period	Silvergrey rockfish harvested		Other non-pelagic rockfish Harvested		Unidentified rockfish total catch		Unidentified rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	14	98	0	0
10May-23May	0	0	0	0	216	7,562	34	945
Derby	0	0	0	0	799	28,502	40	321
24May-06Jun	0	0	0	0	84	2,609	0	0
07Jun-20Jun	0	0	0	0	502	25,594	144	3,798
21Jun-04Jul	0	0	0	0	746	51,891	148	3,219
05Jul-18Jul	0	0	5	22	1,216	131,274	499	21,712
19Jul-01Aug	4	9	33	474	880	84,471	157	4,520
02Aug-15Aug	89	5,556	0	0	567	22,188	206	8,135
16Aug-29Aug	0	0	0	0	448	19,985	163	5,483
30Aug-12Sep	0	0	7	15	921	77,986	519	43,814
13Sep-26Sep	0	0	9	38	444	91,222	88	2,046
Total	93	5,565	54	549	6,837	543,382	1,998	93,993

Seasonal period	Shellfish boat-days		Shellfish pots or rings		Crab boat-days		Crab pots or rings	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	14	256	35	1,597	14	256	35	1,597
10May-23May	29	208	56	1,101	29	208	56	1,101
Derby	62	106	150	1,149	59	94	120	489
24May-06Jun	27	135	57	886	27	135	57	886
07Jun-20Jun	87	1,015	213	9,403	79	876	205	9,264
21Jun-04Jul	190	4,567	379	15,571	160	4,387	312	15,606
05Jul-18Jul	212	5,636	392	14,954	108	1,400	208	5,283
19Jul-01Aug	149	4,439	268	11,072	102	2,705	233	10,649
02Aug-15Aug	137	881	898	205,873	65	310	175	2,216
16Aug-29Aug	152	14,948	259	20,979	54	1,676	42	420
30Aug-12Sep	112	776	340	5,403	75	441	167	1,359
13Sep-26Sep	40	165	148	2,534	29	117	95	1,436
Total	1,211	33,132	3,195	290,522	801	12,605	1,705	50,306

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Seasonal period	Dungeness crab total catch		Dungeness crab harvested		Shrimp harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	315	129,347	161	33,790	0	0
10May-23May	736	189,283	197	9,264	0	0
Derby	1,587	162,939	602	13,318	510	17,340
24May-06Jun	236	16,684	95	1,755	0	0
07Jun-20Jun	1,367	594,164	386	48,224	400	14,000
21Jun-04Jul	2,132	562,595	480	27,618	1,350	44,540
05Jul-18Jul	1,910	710,651	710	78,327	12,840	3,047,140
19Jul-01Aug	3,295	2,946,933	793	128,506	3,230	752,950
02Aug-15Aug	1,869	403,905	471	23,707	32,310	54,768,710
16Aug-29Aug	365	42,605	118	3,969	1,330	75,530
30Aug-12Sep	2,366	214,021	721	59,725	4,750	760,420
13Sep-26Sep	1,185	273,740	225	7,940	1,200	62,380
Total	17,363	6,246,867	4,959	436,143	57,920	59,543,010

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.
[b] Includes 530 large chinook salmon entered in the Ketchikan derby.

Appendix B5.–Estimated effort, harvest and catch for the Juneau marine boat sport fishery by seasonal period, 26 April–26 September 1999.

Seasonal	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
period	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	2,923	661,267	5,632	2,420,829	58	1,526	5,690	2,529,140
10May-23May	12,375	3,666,178	27,519	19,487,131	830	100,260	28,439	20,857,274
24May-06Jun	11,261	701,653	25,412	5,096,830	1,918	212,597	27,416	4,935,060
07Jun-20Jun	12,721	1,864,665	27,075	10,613,599	6,475	1,282,227	33,558	16,283,510
21Jun-04Jul	11,883	2,180,415	20,776	10,808,112	10,112	3,546,929	30,928	21,193,793
05Jul-18Jul	14,022	2,719,640	25,749	16,023,065	13,250	3,117,912	39,114	27,108,255
19Jul-01Aug	13,039	2,698,900	21,274	8,032,970	12,370	3,154,022	33,730	19,811,697
02Aug-15Aug	14,011	8,929,258	26,431	30,475,202	10,694	12,413,178	37,397	79,607,291
Derby[a]	16,767	7,605,156	45,527	69,370,883	1,428	112,321	46,955	70,138,397
16Aug-29Aug	2,846	657,589	6,131	3,391,677	1,281	202,222	7,411	4,914,357
30Aug-12Sep	7,660	2,973,248	16,726	17,447,607	4,238	2,126,334	20,963	29,875,797
13Sep-26Sep	2,016	156,942	3,917	709,291	924	214,880	4,841	675,680
Total	121,524	34,814,911	252,169	193,877,196	63,578	26,484,408	316,442	297,930,251

Seasonal	Boat-days		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
Period	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	826	37,320	140	4,520	140	4,520	90	2,038
10May-23May	2,974	144,823	1,084	46,725	1,060	43,533	206	6,695
24May-06Jun	2,601	43,199	836	11,234	824	10,730	770	31,693
07Jun-20Jun	3,138	118,707	919	21,917	907	21,437	1,026	61,901
21Jun-04Jul	3,196	150,077	880	41,696	880	41,696	540	19,817
05Jul-18Jul	3,455	136,309	433	13,277	388	9,343	1,177	81,127
19Jul-01Aug	3,386	165,666	218	2,037	201	1,539	1,320	64,375
02Aug-15Aug	3,600	572,608	476	27,334	462	26,954	3,880	2,770,499
Derby[a]	2,422	162,921	595	1,901	505	725	6,475	1,837,505
16Aug-29Aug	776	43,713	161	8,835	111	6,363	877	264,490
30Aug-12Sep	1,932	148,420	201	5,509	155	1,807	926	46,733
13Sep-26Sep	608	12,405	6	25	6	25	396	66,380
Total	28,914	1,736,168	5,949	185,010	5,639	168,672	17,683	5,253,253

Seasonal	Chinook salmon < 28" Harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon Total catch	
Period	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	0	0
24May-06Jun	19	120	0	0	0	0	0	0
07Jun-20Jun	83	722	63	641	57	611	10	42
21Jun-04Jul	326	9,034	192	2,631	188	2571	112	1,507
05Jul-18Jul	32	373	3,370	344,380	3,200	319,891	4,947	580,620
19Jul-01Aug	31	182	4,749	544,853	4,578	510,384	5,997	1,508,508
02Aug-15Aug	19	95	7,015	3,326,341	6,789	3,255,448	4,838	4,177,654
Derby[a]	1	0	4,392	109,821	4,324	103,321	1,779	87,288
16Aug-29Aug	0	0	1,724	397,248	1,593	302,186	756	111,065
30Aug-12Sep	0	0	4,979	2,505,997	4,934	2,486,433	546	46,419
13Sep-26Sep	0	0	1,018	84,345	941	64,186	138	8,517
Total	511	10,526	27,502	7,316,257	26,604	7,045,031	19,123	6,521,620

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Seasonal Period	Pink salmon harvested		Chum salmon total catch		Chum salmon harvested		Sockeye salmon catch and harvest	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	0	0
24May-06Jun	0	0	33	188	29	176	0	0
07Jun-20Jun	6	30	66	512	62	500	7	40
21Jun-04Jul	56	668	106	1,154	106	1,154	0	0
05Jul-18Jul	2,593	270,405	314	5,375	241	4,384	25	174
19Jul-01Aug	2,235	138,802	94	446	71	364	7	39
02Aug-15Aug	1,634	131,997	23	144	23	144	13	152
Derby[a]	359	10,974	17	32	17	32	6	24
16Aug-29Aug	91	1,665	20	140	10	92	0	0
30Aug-12Sep	219	13,076	6	35	6	35	0	0
13Sep-26Sep	0	0	0	0	0	0	28	729
Total	7,193	567,617	679	8,026	565	6,881	86	1,158

Seasonal Period	Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch		Rockfish harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	43	807	39	634	18	252	0	0
24May-06Jun	286	10,390	196	3,292	30	750	30	750
07Jun-20Jun	2,375	502,495	1,280	149,357	74	1,358	50	398
21Jun-04Jul	1,378	94,825	1,048	64,671	138	4,145	86	1,373
05Jul-18Jul	2,134	169,878	1,568	88,145	268	9,466	268	9,466
19Jul-01Aug	1,870	97,093	1,450	52,991	223	4,535	189	3,765
02Aug-15Aug	1,598	255,499	1,401	225,632	212	6,013	210	5,973
Derby[a]	447	15,980	303	7,942	87	1,238	76	1,318
16Aug-29Aug	313	18,584	282	14,204	50	2,290	50	2,290
30Aug-12Sep	569	55,166	466	43,769	97	4,064	97	4,064
13Sep-26Sep	77	1,947	72	1,873	0	0	0	0
Total	11,090	1,222,664	8,105	652,510	1,197	34,111	1,056	29,397

Seasonal Period	Lingcod total catch		Lingcod harvested		Dolly Varden total catch		Dolly Varden harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	8	56	8	56
10May-23May	36	1,008	32	772	20	76	9	27
24May-06Jun	18	270	18	270	46	102	34	102
07Jun-20Jun	16	224	16	224	195	2,614	93	896
21Jun-04Jul	12	132	0	0	184	8,700	102	2,130
05Jul-18Jul	6	35	6	35	728	349,466	63	1,139
19Jul-01Aug	38	592	14	74	7	11	2	3
02Aug-15Aug	6	19	0	0	28	479	28	479
Derby[a]	0	0	0	0	8	43	8	43
16Aug-29Aug	0	0	0	0	0	0	0	0
30Aug-12Sep	0	0	0	0	26	633	0	0
13Sep-26Sep	0	0	0	0	0	0	0	0
Total	132	2,280	86	1,375	1,250	362,180	347	4,875

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Seasonal Period	Shellfish boat-days		Shellfish pots or rings		King crab boat-days		King crab pots or rings	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	94	1,341	138	2,448	0	0	0	0
10May-23May	166	1,874	367	9,326	0	0	0	0
24May-06Jun	226	5,002	295	5,628	0	0	0	0
07Jun-20Jun	220	3,383	350	9,349	0	0	0	0
21Jun-04Jul	598	17,214	1,242	79,379	262	7,938	544	37,404
05Jul-18Jul	1,090	14,099	1,925	41,821	868	13,128	1,511	39,286
19Jul-01Aug	1,097	22,977	1,810	59,865	841	17,852	1,427	47,976
02Aug-15Aug	650	11,360	1,300	48,188	477	7,798	882	26,811
Derby[a]	52	120	85	361	28	45	44	112
16Aug-29Aug	202	4,889	373	22,705	131	2,500	212	9,783
30Aug-12Sep	507	11,436	924	33,750	334	4,426	635	19,713
13Sep-26Sep	228	8832	443	38,224	146	3,165	278	12,319
Total	5,130	102,527	9,252	351,044	3,087	56,852	5,533	193,404

Seasonal Period	King crab harvested		Tanner crab harvested		Dungeness crab harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	43	1,650	128	7,232
10May-23May	0	0	888	722,832	203	8,198
24May-06Jun	0	0	24	480	304	19,432
07Jun-20Jun	0	0	0	0	370	23,366
21Jun-04Jul	660	60,508	78	1,398	1,054	120,437
05Jul-18Jul	2,195	128,860	349	7,570	862	56,747
19Jul-01Aug	1,429	45,665	222	5,244	932	66,280
02Aug-15Aug	1,324	107,713	41	534	881	238,600
Derby[a]	74	441	58	1,930	74	2,052
16Aug-29Aug	454	39,898	0	0	373	58,949
30Aug-12Sep	950	57,146	64	1,392	225	14,721
13Sep-26Sep	253	20,906	6	25	193	12,565
Total	7,339	461,137	1,773	743,055	5,599	628,579

[a] Includes 397 large chinook salmon and 2,851 coho salmon entered in the derby.

Appendix B6.–Estimated effort, harvest and catch for the Sitka marine boat sport fishery by seasonal period, 26 April–26 September 1999.

Seasonal period	Boat-hours		Salmon-hours		Bottomfish-hours		Angler-hours	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	1,297	114,847	2,084	309,788	305	20,922	2,431	371,421
10May-23May	4,333	524,272	9,775	3,241,392	1,948	504,993	11,723	4,836,394
Derby[a]	10,257	678,233	23,707	3,332,239	1,950	190,585	25,665	4,223,319
24May-06Jun	3,852	860,709	10,781	9,921,429	1,003	136,043	11,784	11,424,463
07Jun-20Jun	10,768	1,472,641	25,631	9,707,957	7,741	1,335,527	33,372	15,030,892
21Jun-04Jul	10,730	982,446	22,169	3,478,336	9,816	2,476,855	32,166	8,617,311
05Jul-18Jul	7,201	1,303,437	15,797	8,177,276	4,993	1,090,509	22,009	13,747,045
19Jul-01Aug	8,055	2,733,920	16,064	12,402,587	8,742	6,778,822	25,324	35,115,725
02Aug-15Aug	8,022	921,500	17,791	6,783,696	9,730	2,157,395	27,855	14,518,695
16Aug-29Aug	7,580	1,498,015	18,232	9,039,823	7,357	3,051,569	25,607	18,609,393
30Aug-12Sep	3,344	1,374,006	6,474	6,087,907	4,195	2,634,513	10,669	15,891,505
13Sep-26Sep	167	5,002	288	30,656	119	2,766	407	42,631
Total	75,606	12,469,028	168,793	72,513,086	57,899	20,380,499	229,012	142,428,794

Seasonal period	Boat-days		Chinook salmon ≥ 28" total catch		Chinook salmon ≥ 28" harvested		Chinook salmon < 28" total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	474	14,082	309	24,855	246	14,910	18	288
10May-23May	1,220	34,564	2,543	339,013	1,990	189,323	65	1,330
Derby[a]	1,803	18,189	2,355	96,409	2,144	71,460	271	3,227
24May-06Jun	874	37,734	1,891	450,426	1,738	353,343	77	1,415
07Jun-20Jun	2,808	119,906	7,309	756,631	5,883	567,809	432	11,107
21Jun-04Jul	2,868	94,336	6,196	981,279	4,836	599,923	284	2,891
05Jul-18Jul	1,936	78,459	1,698	106,915	1,380	70,412	154	3,351
19Jul-01Aug	2,651	311,269	1,357	212,253	1,243	172,986	121	3,773
02Aug-15Aug	2,434	93,509	809	32,199	779	31,125	111	1,569
16Aug-29Aug	2,095	124,608	463	9,451	452	8,492	77	619
30Aug-12Sep	1,045	118,011	50	856	50	856	37	745
13Sep-26Sep	66	787	0	0	0	0	16	208
Total	20,274	1,045,454	24,980	3,010,287	20,741	2,080,639	1,663	30,523

Seasonal period	Chinook salmon < 28" harvested		Coho salmon total catch		Coho salmon harvested		Pink salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	0	0
Derby[a]	3	4	117	2412	100	1,842	6	20
24May-06Jun	0	0	10	83	10	83	0	0
07Jun-20Jun	0	0	1,745	151,242	1,586	111,662	444	27,216
21Jun-04Jul	6	30	5,855	453,253	5,506	392,042	622	21,382
05Jul-18Jul	53	926	9,023	3,458,335	8,417	3,092,095	999	39,296
19Jul-01Aug	0	0	13,984	19,289,892	13,467	19,086,106	2,116	220,120
02Aug-15Aug	0	0	18,405	10,879,497	17,932	10,350,428	2,378	174,724
16Aug-29Aug	1	0	19,645	14,355,363	19,224	13,962,805	2,724	461,663
30Aug-12Sep	0	0	7,457	8,693,541	7,355	8,349,748	320	18,078
13Sep-26Sep	0	0	181	26,716	160	20,800	0	0
Total	63	960	76,422	57,310,334	73,757	55,367,611	9,609	962,499

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Seasonal period	Pink salmon harvested		Chum salmon total catch		Chum salmon harvested		Sockeye salmon total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	0	0	0	0
10May-23May	0	0	0	0	0	0	0	0
Derby[a]	6	20	6	20	3	5	3	4
24May-06Jun	0	0	0	0	0	0	0	0
07Jun-20Jun	292	13,443	22	238	22	238	0	0
21Jun-04Jul	396	7,746	11	53	11	53	366	42,798
05Jul-18Jul	556	16,490	68	1,142	57	912	2,832	640,443
19Jul-01Aug	938	45,264	127	2,195	80	1,222	1,893	486,709
02Aug-15Aug	1,197	70,031	214	12,347	189	8,169	26	297
16Aug-29Aug	785	49,578	189	15,018	170	13,811	0	0
30Aug-12Sep	156	3,518	16	110	6	32	0	0
13Sep-26Sep	0	0	0	0	0	0	0	0
Total	4,326	206,090	653	31,123	538	24,442	5,120	1,170,251

Seasonal period	Sockeye salmon harvested		Pacific halibut total catch		Pacific halibut harvested		Rockfish total catch	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	9	72	9	72	609	78,036
10May-23May	0	0	1,074	246,376	748	116,858	856	49,921
Derby[a]	0	0	1,509	138,892	940	55,029	3,415	187,378
24May-06Jun	0	0	288	15,782	211	6,253	864	61,642
07Jun-20Jun	0	0	5,259	729,293	3,360	300,056	4,789	466,989
21Jun-04Jul	366	42,798	6,785	1,405,472	4,352	700,578	5,303	603,806
05Jul-18Jul	2,801	632,907	3,454	679,180	2,381	364,800	3,492	703,609
19Jul-01Aug	1,820	469,209	6,964	7,517,660	4,363	2,445,707	3,793	682,673
02Aug-15Aug	26	297	6,455	1,298,253	4,680	636,610	3,973	468,709
16Aug-29Aug	0	0	6,714	3,638,967	4,708	1,630,210	3,087	206,818
30Aug-12Sep	0	0	3,024	1,621,649	2,203	883,370	1,263	216,556
13Sep-26Sep	0	0	12	67	12	67	11	103
Total	5,013	1,145,211	41,547	17,291,663	27,967	7,139,610	31,455	3,726,240

Seasonal period	Rockfish harvested		Lingcod total catch		Lingcod harvested		Quillback rockfish Harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	156	4,908	78	2,604	36	1,188	27	648
10May-23May	464	13,148	133	4,157	107	2,911	35	327
Derby[a]	790	16,989	404	5,232	294	4,039	91	680
24May-06Jun	336	41,606	115	1,741	77	1,050	58	1,523
07Jun-20Jun	2,075	109,055	927	21,040	835	19,142	223	19,968
21Jun-04Jul	1,902	113,079	1,072	78,141	963	68,043	79	1,198
05Jul-18Jul	1,424	150,267	431	12,348	297	5,776	91	2,650
19Jul-01Aug	2,010	302,840	488	24,951	469	25,591	208	12,332
02Aug-15Aug	1,979	111,060	799	16,080	699	17,144	43	309
16Aug-29Aug	1,612	87,237	932	59,878	916	59,157	43	571
30Aug-12Sep	653	87,315	286	21,086	268	18,182	0	0
13Sep-26Sep	11	103	0	0	0	0	0	0
Total	13,412	1,037,607	5,665	247,258	4,961	222,223	898	40,206

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Seasonal period	Dusky rockfish harvested		Copper rockfish harvested		Black rockfish harvested		Other pelagic rockfish Harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	0	0	0	0	84	2,328	0	0
10May-23May	14	204	11	92	171	3,124	32	462
Derby[a]	27	152	48	200	345	4,253	65	746
24May-06Jun	10	83	0	0	221	32,730	19	330
07Jun-20Jun	12	120	27	253	696	46,228	160	3,459
21Jun-04Jul	44	331	5	23	440	8,874	146	5,966
05Jul-18Jul	53	2,494	0	0	625	56,319	154	5,146
19Jul-01Aug	32	308	0	0	428	24,905	76	3,639
02Aug-15Aug	5	18	0	0	710	27,114	193	10,020
16Aug-29Aug	6	35	0	0	569	44,446	84	2,201
30Aug-12Sep	0	0	19	311	308	49,296	12	130
13Sep-26Sep	11	103	0	0	0	0	0	0
Total	214	3,848	110	879	4,597	299,617	941	32,099

Seasonal period	Yelloweye rockfish harvested		Silvergrey rockfish harvested		Unidentified rockfish total catch		Unidentified rockfish Harvested	
	Estimate	Variance	Estimate	Variance	Estimate	Variance	Estimate	Variance
26Apr-09May	45	636	0	0	453	54,276	0	0
10May-23May	165	10,888	36	840	392	28,311	0	0
Derby[a]	166	1,939	21	120	2,647	113,738	27	444
24May-06Jun	19	148	10	83	528	28,272	0	0
07Jun-20Jun	801	22,015	18	126	2,806	207,376	138	3,413
21Jun-04Jul	1,172	130,082	5	23	3,316	313,739	11	92
05Jul-18Jul	501	23,110	0	0	2,067	386,304	0	0
19Jul-01Aug	1,254	234,652	12	58	1,776	171,417	0	0
02Aug-15Aug	991	38,267	5	18	1,842	186,077	33	886
16Aug-29Aug	813	44,616	18	156	1,508	113,607	78	3,620
30Aug-12Sep	305	15,145	9	78	585	36,073	0	0
13Sep-26Sep	0	0	0	0	0	0	0	0
Total	6,232	521,498	134	1,502	17,920	1,639,190	287	8,455

[a] Includes 637 large chinook salmon entered in the derby.

Appendix B7.–Recorded effort and harvest from the Petersburg marine boat catch sampling program by biweekly period, 3 May–11 July 1999.

Biweekly period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon ≥28" harvested	Chinook salmon ≥28" sampled[b]	Chinook salmon <28" harvested	Coho salmon harvested	Pacific halibut harvested	Rockfish harvested
26 Apr–09 May[c]	102	19	3	3	0	0	5	0
10 May–23 May	551	78	26	26	0	0	4	6
24 May–06 Jun	744	268	20	20	0	0	37	8
Derby entered[d]			479	460	0	0		
Derby other			13	13	0	0		
07 Jun–20 Jun	1,468	515	63	57	0	0	109	6
21 Jun–04 Jul	561	1,038	11	11	0	0	247	15
05 Jul–18 Jul[e]	124	574	1	1	0	2	119	5
Total	3,550	2,492	616	591	0	2	521	40

[a] Sampling was conducted 5 days per week by one sampler working 7-hr shifts. This table does not include 209 chinook ≥28" harvested (160 sampled), and 16 chinook <28" harvested (14 sampled) from the Wrangell Narrows/Blind Slough terminal harvest area opened on 1 June.

[b] Fish were sampled for presence or absence of adipose fin, and heads were collected from fish with missing adipose fins.

[c] Sampling was only conducted during the second week of this biweekly period.

[d] Petersburg derby held 28–31 May; effort, and harvest of species other than chinook salmon were not recorded during this event.

[e] Sampling was only conducted during the first week of this biweekly period.

Appendix B8.–Recorded effort and harvest from the Wrangell marine boat catch sampling program by biweekly period, 26 April–4 July 1999.

Biweekly period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon >28" sampled[b]	Chinook salmon <28" sampled[b]	Pacific halibut harvested	Rockfish harvested
26 Apr–09 May	345	63	22	22	0	3	0
10 May–23 May	1,935	31	67	48	0	5	3
24 May–06 Jun	2,756	122	151	150	0	24	4
07 Jun–20 Jun	1,289	199	59	58	1	29	3
21 Jun-04 Jul	73	20	5	5	0	5	0
Total	6,397	434	304	283	1	66	10

[a] Sampling was conducted 5 days per week by one sampler working 7-hour shifts.

[b] Fish were examined for presence or absence of adipose fin, and heads were collected from fish with missing adipose fins.

Appendix B9.–Recorded effort and harvest from the Craig/Klawock marine boat catch sampling program by biweekly period, 26 April–12 September 1999.

Biweekly Period[a]	Salmon-hours	Bottomfish-hours	Chinook salmon harvested	Chinook salmon sampled[b]	Coho salmon harvested	Coho salmon sampled[b]	Chum salmon Harvested
26Apr-09May	101	89	5	4	0	0	0
10May-23May	613	225	40	28	0	0	0
24May-06Jun	1,761	376	115	95	1	1	0
07Jun-20Jun	2,425	682	144	113	74	71	0
21Jun-04Jul	1,988	777	129	113	341	287	0
05Jul-18Jul	2,700	771	70	52	1,295	1,017	0
19Jul-01Aug	2,176	801	46	31	1,561	1,304	2
02Aug-15Aug	2,202	787	29	23	1,691	1,483	0
16Aug-29Aug	1,451	315	5	2	1,200	1,027	0
30Aug-12Sep	1,089	630	3	3	583	553	0
Total	16,503	5,440	586	464	6,746	5,743	2

Biweekly Period[a]	Pink salmon Harvested	Pacific halibut harvested	Lingcod harvested	Rockfish harvested	Additional sampling[c] Chinook sampled	Additional sampling[c] Coho sampled
26Apr-09May	0	20	5	15	0	0
10May-23May	0	24	23	63	12	0
24May-06Jun	0	99	24	138	116	0
07Jun-20Jun	4	207	73	311	156	51
21Jun-04Jul	14	238	68	269	223	343
05Jul-18Jul	114	183	49	343	99	1,327
19Jul-01Aug	191	357	94	195	78	1,377
02Aug-15Aug	396	370	77	287	143	1,786
16Aug-29Aug	163	169	11	165	24	1,538
30Aug-12Sep	66	108	12	220	0	72
Total	948	1,775	436	2,006	851	6,494

[a] Sampling was conducted at the Craig harbors from 11 a.m. through 8 p.m. each Thursday through Sunday; and beginning 17 May, from 12 p.m. through 7 p.m. each Monday through Wednesday. Sampling was conducted at the Klawock sites from 12 p.m. through 7 p.m. Saturday and Sunday.

[b] Fish were sampled for presence or absence of adipose fin, and heads were collected from fish with missing adipose fins.

[c] Sampling was conducted at additional charter sites as time permitted to increase the recoveries of coded wire tags.

Appendix B10.–Numbers of chinook salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1999.

Sport fishery	Seasonal period	Chinook salmon ≥ 28″ Estimated harvest	Chinook salmon ≥ 28″ Number Sampled	Chinook salmon ≥ 28″ Percent	Chinook salmon < 28″ Estimated harvest	Chinook salmon < 28″ Number Sampled	Chinook salmon < 28″ Percent
Creel surveys							
Ketchikan	4/26–6/20	983	149	15	0	0	0
	Derby entered[a]	530	474	89	0	0	0
	Derby not entered[a]	82	19	23	0	0	0
	6/21–8/01	2,684	574	21	294	65	22
	8/02–9/26	215	66	31	26	11	42
	Total	4,494	1,282	29	320	76	24
Juneau	4/26–6/20	2,931	694	24	102	31	30
	6/21–8/01	1,469	364	25	389	54	14
	8/02–9/26	734	193	26	19	5	26
	Derby entered[b]	396	351	89	1	1	100
	Derby take-home[b]	109	34	31	0	0	0
	Total	5,639	1,636	29	511	91	18
Sitka	4/26–6/20	9,857	1,756	18	0	0	0
	Derby entered[c]	637	637	100	0	0	0
	Derby take-home[c]	1,507	443	29	3	1	33
	6/21–8/01	7,459	2,051	27	59	2	3
	8/02–9/26	1,281	353	28	1	1	100
	Total	20,741	5,240	25	63	4	6
Creel survey totals		30,874	8,158	26	894	171	19
Catch sample programs							
Petersburg	5/03–7/11[d]		118			0	
	Derby entered[e]	479	460	96		0	
	Derby take-home[e]		13			0	
	Total		591			0	
Wrangell	4/26–7/04		283			1	
Craig/Klawock	4/26–9/12		1,315			0	
	Catch sample total		2,189			1	
	Total sampled		10,347			172	

[a] Derby held 29-31 May, 6-7 June, and 12-13 June.

[b] Derby held 20-22 August.

[c] Derby held 29-31 May and 6-7 June.

[d] Does not include 160 chinook ≥ 28” and 14 chinook <28” sampled from the Wrangell Narrows/Blind Slough terminal harvest area opened on 1 June.

[e] Derby held 28–31 May.

Appendix B11.–Estimates of hatchery-produced and wild tagged chinook salmon contributed to the Ketchikan marine boat sport fishery, 26 April–26 September 1999[a].

Region	Agency[c]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Derby[b]			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Total		
				Rec[d]	Con[e]	Variance[f]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS																		
British Columbia	CDFO	Kitimat River	18-14-35	1	51	2,555										1	51	2,555
			18-22-54				1	21	402							1	21	402
			18-22-55							1	16	239				1	16	239
			18-28-49	1	31	964										1	31	964
		Pemberton F&G PIP	18-15-14				1	1	0							1	1	0
		Quinsam River	18-25-13	1	68	4,601										1	68	4,601
		Robertson Creek	18-14-59				1	55	2,988							1	55	2,988
			18-22-25							1	3	9				1	3	9
		Shuswap River	18-24-61				1	6	33							1	6	33
		B.C. total		3	150	11,382	4	83	3,423	2	19	248				9	252	15,053
Idaho	WDFW	Lyons Ferry	63-63-21				1	1	0							1	1	0
		Idaho Total					1	1	0							1	1	0
Oregon	ODFW	Umatilla	07-13-58				1	2	3							1	2	3
		Oregon Total					1	2	3							1	2	3
Washington	WDFW	Priest Rapids	63-60-01							1	131	17,118				1	131	17,118
		Similkameen	63-60-51	1	8	57										1	8	57
		Wells Hatchery	63-01-34										1	2	4	1	2	4
			63-41-30				1	1	0							1	1	0
		Washington Total		1	8	57	1	1	0	1	131	17,118	1	2	4	4	142	17,179
Alaska	ADFG	Crystal Lake	04-47-17							1	17	291				1	17	291
		Crystal Lake/ Neets Bay	04-42-43				2	25	288							2	25	288
			04-50-03							1	31	955				1	31	955
	KTHC	Deer Mountain	04-43-14	1	53	2,806	1	6	28							2	59	2,834
			04-43-15				1	6	25							1	6	25
			04-45-02	1	26	638	1	5	16	2	40	786				4	71	1,440
			04-45-04				1	5	16							1	5	16
			04-47-37	1	33	1,038	3	17	80	1	25	617				5	75	1,735
			04-47-38							3	71	1,661				3	71	1,661
	MIC	Tamgas Creek	47-17-05				1	3	8							1	3	8
			47-17-12				1	23	495							1	23	495
			47-17-27							2	66	2,250				2	66	2,250
	NMFS	Little Port Walter	03-22-48										1	3	9	1	3	9
	SSRA	Carroll Inlet	04-44-17				1	8	62							1	8	62
			04-44-18				1	11	101							1	11	101
			04-44-19				1	11	101							1	11	101
			04-44-20				1	12	121							1	12	121
			04-44-21				2	32	477	1	72	5,055				3	104	5,532
		Neets Bay	04-45-44				1	12	134	1	49	2,317				2	61	2,451

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Region	Agency[c]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Derby[b]			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Total		
				Rec[d]	Con[e]	Variance[f]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	SSRA	Neets Bay	04-46-01				1	10	88							1	10	88
			04-46-03				1	10	94							1	10	94
			04-46-04							1	42	1,759				1	42	1,759
			04-47-45							1	51	2,546				1	51	2,546
		Whitman Lake	04-44-07	2	30	520	5	13	21	2	20	173				9	63	713
			04-45-61							2	38	698				2	38	698
			04-45-62	1	29	828				4	80	1,569				5	109	2,397
			04-47-54							2	93	4,438				2	93	4,438
			04-47-55							2	91	4,042				2	91	4,042
			04-47-56							3	134	5,957				3	134	5,957
			04-47-57	1	88	7,605				2	82	3,299				3	170	10,904
			04-47-58				3	29	246	3	124	5,169				6	153	5,415
			04-47-59				1	11	102	5	231	11,096				6	242	11,198
			04-47-60				2	22	213	5	232	11,306	1	18	316	8	272	11,836
			04-49-60							1	58	3,272				1	58	3,272
			04-49-61							1	58	3,280				1	58	3,280
			04-49-62							1	50	2,422				1	50	2,422
		Alaska total		7	259	17,178	31	271	2,717	47	1,755	118,974	2	21	325	87	2,306	139,194
		All regions		11	417	36,686	38	358	6,143	50	1,905	146,328	3	23	329	102	2,703	189,486
									WILD STOCKS[g]									
Alaska	ADFG	Unuk River	04-33-50	1	122	14,764	2	27	331	1	59	3,481				4	144	18,576
			04-35-57				1	13	165							1	13	165
			04-35-58	1	116	13,372				1	57	3,152				2	105	16,524
			04-35-59				1	13	147							1	13	147
		Wild stocks total		2	238	32,288	4	53	642	2	116	6,896				8	407	39,826

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Derby held on 29-31 May, 5-6 June, and 12-13 June 1999.

[c] CDFO = Canada Department of Fisheries and Oceans, WDFW = Washington Department of Fisheries and Wildlife, ODFW = Oregon Department of Fish and Wildlife, ADFG = Alaska Department of Fish and Game, KTHC = Ketchikan Tribal Hatchery Corporation, MIC = Metlakatla Indian Community, NMFS = National Marine Fisheries Service, SSRA = Southern Southeast Regional Aquaculture Association.

[d] Rec = Number of fish recovered of noted tag code.

[e] Con = Estimated harvest (contribution) of the release of the noted tag code.

[f] Variance = Variance of the estimated harvest of the release of the noted tag code.

[g] Wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B12.–Estimates of hatchery-produced and wild tagged chinook salmon contributed to the Juneau marine boat sport fishery, 26 April–26 September 1999.

Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS																		
British Columbia	CDFO	Shotbolt Bay	18-13-18	1	1	0										1	1	0
		B.C. total		1	1	0										1	1	0
Alaska	ADFG	Big Boulder	04-01-03-0214	1	3	8							1	1	0	2	4	8
		Crystal Lake	04-46-10				1	21	411							1	21	411
			04-46-19	1	56	3,065										1	56	3,065
		Crystal Lake/ Earl West Cove	04-45-36										1	12	140	1	12	140
			04-45-38										1	12	137	1	12	137
		Crystal Lake/ Neets Bay	04-42-43										1	12	139	1	12	139
		Snettisham	04-10-02-1401	1	43	1,774										1	43	1,774
			04-40-51	1	11	113										1	11	113
	DIPC	Gastineau	04-37-37				2	24	282				3	13	40	5	37	322
			04-37-38	1	12	138	1	8	56	1	18	296	5	22	75	8	60	565
			04-42-61	2	29	430	1	7	43	1	16	231	2	8	23	6	60	727
			04-44-37	2	40	824	5	104	2,512	1	22	468				8	166	3,805
			04-44-38	3	57	1,134	7	158	4,257							10	215	5,391
			04-44-39	1	16	247										1	16	247
			50-04-01	5	66	903	9	153	3,201	1	15	219	5	21	68	20	255	4,391
			50-04-02	1	8	51	5	29	172	2	13	90	5	8	6	13	58	319
			50-04-03	1	11	121	2	12	82	2	9	42	1	2	1	6	34	246
			50-04-04	2	18	154							4	19	97	6	37	251
			50-04-05										2	6	13	2	6	13
			50-04-23										1	10	89	1	10	89
			50-04-24				2	74	2,787							2	74	2,787
			50-04-25	2	54	1,421	2	73	2,707							4	127	4,127
			50-04-26				1	39	1,505				1	10	98	2	49	1,603
			50-04-27	2	56	1,529	2	105	5,864				1	10	90	5	171	7,483
			50-04-28	1	14	195										1	14	195
			50-04-39				1	43	1,843							1	43	1,843
			50-04-42				1	42	1,755	1	21	435				2	63	2,190
	MIC	Tamgas Creek	47-17-27							1	32	1,008				1	32	1,008
	NMFS	Little Port Walter	03-01-40				1	7	39	1	4	14				2	11	53
			03-01-44							1	5	18	2	4	8	3	9	26
			03-21-37	1	6	30										1	6	30

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	NMFS	Little Port Walter	03-22-53	1	9	68										1	9	68
			03-22-58							1	5	17				1	5	17
			03-23-06				1	2	2							1	2	2
			03-23-08										1	1	0	1	1	0
			03-23-09										1	1	0	1	1	0
			03-62-18							1	5	19	1	3	8	2	8	27
			03-62-23							1	5	18	1	1	0	2	6	18
			03-62-24										1	1	0	1	1	0
			03-62-27										1	3	7	1	3	7
			03-62-29										1	1	0	1	1	0
	NSRA	Hidden Falls	04-43-24	2	82	3,522										2	82	3,522
			04-43-25	2	65	2,115										2	65	2,115
			04-45-21	1	71	4,987	1	28	776							2	99	5,763
			04-45-22										1	17	264	1	17	264
			04-47-11	1	33	1,066	3	65	1,452	5	179	7,677	4	48	520	13	325	10,716
	SSRA	Whitman Lake	04-47-59							1	38	1,421	1	11	101	2	49	1,522
		Alaska total		35	760	28,772	48	994	46,162	21	387	16,242	49	257	1,944	153	2,398	93,120
		All regions		36	761	28,772	48	994	46,162	21	387	16,242	49	257	1,944	154	2,399	93,120
									WILD STOCKS[f]									
Alaska	ADFG	Taku River	04-42-29	1	812	658,288										1	812	658,288
			04-42-34	1	343	117,103										1	343	117,103
		Wild stocks total		2	1,155	775,391										2	1,204	775,391

[a] Derby held on 20-22 August 1999.

[b] CDFO = Canada Department of Fisheries and Oceans, ADFG = Alaska Department of Fish and Game, DIPC = Douglas Island Pink and Chum, MIC = Metlakatla Indian Community, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SSRA = Southern Southeast Regional Aquaculture Association.

[c] Rec = Number of fish recovered of noted tag code.

[d] Con = Estimated harvest (contribution) of the release of the noted tag code.

[e] Variance = Variance of the estimated harvest of the release of the noted tag code.

[f] Wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B13.–Estimates of hatchery-produced and wild tagged chinook salmon contributed to the Sitka marine boat sport fishery, 26 April–26 September 1999.

Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Derby[a]			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS																		
British Columbia	CDFO	Conuma River	18-19-54	1	160	25,538										1	160	25,538
			18-21-51				1	38	1,436							1	38	1,436
		Fort Babine	18-26-08							1	4	12				1	4	12
		Gillard Pass	18-13-52							1	3	8				1	3	8
		Kitimat River	18-22-55	1	19	326				1	14	175				2	33	502
		Nitinat River	18-13-46	2	272	38,689	1	19	342	2	120	7,039				5	411	46,069
			18-13-47	1	132	17,347										1	132	17,347
			18-13-48	1	178	31,574				3	365	45,539	1	116	13,364	5	659	90,476
			18-13-50	1	150	22,325										1	150	22,325
			18-18-05	1	58	3,340										1	58	3,340
			18-18-32	1	271	73,252										1	271	73,252
			18-18-41				1	45	2,007				1	161	25,734	2	206	27,741
			18-18-59							1	151	22,534				1	151	22,534
			18-18-61										1	17	273	1	17	273
			18-19-02										1	41	1,616	1	41	1,616
			18-20-48							1	3	8				1	3	8
		Quinsam River	18-16-60										1	34	1,117	1	34	1,117
			18-06-34	1	65	4,201	2	35	799	1	24	533				4	124	5,533
		Robertson Creek	18-14-55							1	167	27,795				1	167	27,795
			18-14-58	2	456	105,358										2	456	105,358
			18-14-59				1	184	33,768							1	184	33,768
			18-22-20	1	6	26										1	6	26
			18-22-22				1	1	0							1	1	0
			18-22-29	1	5	24				1	4	12				2	9	37
		San Juan River	18-13-33							2	95	4,524				2	95	4,524
			18-14-25							1	60	3,499				1	60	3,499
		Shotbolt Bay	18-13-18				1	4	12							1	4	12
			18-22-50							2	9	34				2	9	34
		Shuswap River	18-24-61	1	30	882				4	89	2,060				5	119	2,942
			18-24-62	3	138	6,296	1	9	71	2	72	2,603				6	219	8,970
		Snootli Creek	18-12-30				1	14	180							1	14	180
			18-12-38				1	24	545							1	24	545
			18-15-56				1	1	0							1	1	0
			18-21-46	2	11	54										2	11	54
			18-31-47				1	42	1,741							1	42	1,741
			18-31-48	1	62	3,763	1	11	117							2	73	3,880
		Stuart Island	18-13-53	1	16	235										1	16	235
		Tahsis PIP	18-18-23	1	31	919										1	31	919
			18-18-24	1	19	342										1	19	342
		Tenderfoot Cr.	18-25-19										1	24	554	1	24	554

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Derby[a]			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	CDFO	Terrace	02-11-04							1	3	7				1	3	7
			18-06-40							1	4	13				1	4	13
			18-06-41							2	8	26				2	8	26
			18-14-23	1	9	70										1	9	70
			18-21-55	1	6	25	1	1	0							2	7	25
			18-21-56							1	4	13				1	4	13
			18-23-39	1	6	25										1	6	25
		Tofino PIP	18-22-51	5	29	156	2	2	0	1	4	12				8	35	168
		B.C. total		32	2,129	371,555	17	430	43,031	30	1,203	135,544	6	393	45,036	85	4,155	595,166
Idaho	NEZP	Big Canyon	63-59-60				1	3	8							1	3	8
		Idaho Total					1	3	8							1	3	8
Oregon	ODFW	Bonneville	07-11-54							1	32	1,024				1	32	1,024
		Elk River	07-08-54							2	14	81	1	6	30	3	20	110
		Fall Creek	07-13-49	1	15	221							1	12	138	2	27	358
		Gardiner Creek	07-11-18							3	12	40				3	12	40
		Rock Creek	07-07-52	1	6	27										1	6	27
			07-51-17	1	12	121										1	12	121
		South Santiam	07-12-56							1	4	13				1	4	13
		Trask	07-13-19	1	7	48										1	7	48
			07-54-18							1	9	80				1	9	80
		Umtilla	07-13-26										1	21	433	1	21	433
		Oregon total		4	40	424				8	71	1,329	3	39	638	15	150	2,391
Washington	ELWA	Elwha	21-26-17	1	6	28										1	6	28
	FWS	Makah on Sooes	05-37-53				1	11	102	1	9	72				2	20	174
			05-40-49				1	16	228	1	13	161				2	29	389
		Prosser	05-01-01-1213	1	51	2,584										1	51	2,584
		Quinault	05-35-21							1	3	9				1	3	9
		Cook	05-36-13							1	10	88				1	10	88
	MAKA	Hoko Falls	21-29-49							1	3	8				1	3	8
	NMFS	Columbia R.	23-27-16	1	5	24										1	5	24
			23-30-27										1	4	9	1	4	9
			23-30-28							1	3	7				1	3	7
			23-30-29	1	5	24										1	5	24
			23-30-50	1	5	24										1	5	24
	QDNR	Quinault Lake	21-29-20				1	11	111							1	11	111
			21-29-21							2	16	113				2	16	113
			21-30-41	1	67	4,439										1	67	4,439
			21-30-42	1	12	129				2	14	81				3	26	211
		Salmon R	21-24-25										1	4	11	1	4	11
			21-26-24							1	4	14				1	4	14

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Derby[a]			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Washington	WDFW	Carlton Pond	63-57-60							2	9	29				2	9	29
			63-57-61							1	4	13				1	4	13
		Cowlitz	63-60-05							1	169	28,575				1	169	28,575
			63-60-18							1	15	197				1	15	197
		Dryden Pond	63-58-39	2	15	104				1	4	14				3	19	118
			63-58-40	2	10	41										2	10	41
		Klickitat	63-53-34	1	152	22,979										1	152	22,979
			63-60-07							1	72	5,093				1	72	5,093
		Lyons Ferry	63-58-44							1	4	12				1	4	12
			63-58-45							1	4	12				1	4	12
		North Toutle	63-61-10	1	131	16,945										1	131	16,945
		Priest Rapids	63-60-01							3	240	23,367				3	240	23,367
			63-63-28										1	91	8,215	1	91	8,215
		Ringold Springs	05-01-02-0202							1	14	189				1	14	189
		Similkameen	63-55-36										1	4	11	1	4	11
			63-57-62	6	37	221	1	1	0	1	3	8				8	41	229
			63-60-51							1	3	7				1	3	7
		Turtle Rock	63-58-46	1	30	849										1	30	849
		Washougal	63-61-08	1	42	1,695										1	42	1,695
			63-61-09							1	205	41,872				1	205	41,872
		Wells	63-58-38	1	6	26										1	6	26
		Washington total		22	574	52,594	4	39	453	27	821	140,823	4	103	8,308	57	1,537	202,178
Alaska	ADFG	Crystal Lake	04-46-11				1	10	86							1	10	86
		Snettisham	04-01-02-1401				1	14	171							1	14	171
	DIPC	Gastineau	04-44-38	1	27	698	1	5	19							2	32	717
	MIC	Tamgas Creek	47-17-05				1	11	116							1	11	116
	NMFS	Little Port Walter	03-01-38				1	1	0							1	1	0
			03-01-39							1	4	13				1	4	13
			03-22-47	3	17	78				1	3	7				4	20	85
			03-22-51	1	6	26										1	6	26
			03-22-53	1	5	18	1	4	12	1	3	8				3	12	39
			03-22-54							1	4	14				1	4	14
			03-22-55							1	3	7				1	3	7
			03-22-56	1	6	26				1	4	13				2	10	39
			03-23-09	1	4	16										1	4	16
			03-62-01				1	1	0							1	1	0
			03-62-18	2	15	107										2	15	107
			03-62-20							1	4	14				1	4	14
			03-62-23				1	1	0							1	1	0

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26-6/20			Derby[a]			Non-derby 6/21-8/01			Non-derby 8/02-9/26			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
Alaska	NSRA	Hidden Falls	04-45-21							1	56	3,049				1	56	3,049
			04-47-11	1	58	3,258	1	40	1,555	1	43	1,771				3	141	6,584
		Medvejie	04-07-09				1	41	1,680							1	41	1,680
			04-41-21	1	50	2,475										1	50	2,475
			04-43-29							1	62	3,822				1	62	3,822
			04-43-58	1	85	7,181	1	16	229	1	63	3,912				3	164	11,323
			04-43-59							2	124	7,726				2	124	7,726
			04-45-19	1	82	6,649										1	82	6,649
			04-45-33	2	187	17,327	4	232	16,244	2	152	11,646				8	571	45,217
			04-45-34*2	1	68	4,526	3	37	426							4	105	4,953
			04-45-37							2	124	7,809				2	124	7,809
			04-45-39	1	89	7,771	1	61	3,718	2	131	8,688				4	281	20,177
			04-47-01	2	116	6,786	1	45	1,948	3	133	5,940				6	294	14,675
			04-47-03				1	11	112	2	90	4,027				3	101	4,139
	SJ	Sheldon Jackson	04-45-11	4	118	3,607										4	118	3,607
	SSRA	Neets Bay	04-46-03				1	34	1,133							1	34	1,133
		Whitman Lake	04-45-61							1	14	189				1	14	189
			04-45-62							1	18	306				1	18	306
		Alaska total		24	933	72,654	22	564	32,041	26	1,035	80,762				72	2,532	185,457
		All regions		82	3,676	595,991	44	1,036	85,882	91	3,130	461,280	13	535	57,794	230	8,377	1,200,947
									WILD STOCKS[f]									
Alaska	ADFG	Unuk River	04-42-08										1	40	1,530	1	40	1,530
		Alaska total											1	40	1,530	1	40	1,530
Washington	COOP	Hanford Reach	63-57-59				1	4	13							1	4	13
		Washington total					1	4	13							1	4	13
		Wild stocks total					1	4	13				1	40	1,530	2	44	1,543

[a] Derby held on 29-31 May and 5-6 June 1999.

[b] CDFO = Canada Department of Fisheries and Oceans, NEZP = Nez Perce Tribe, ODFW = Oregon Department of Fish and Wildlife, ELWA = Lower Elwha S'Klallam Tribe, FWS=U.S. Fish and Wildlife Service, MAKA=`Makah Tribe, QDNR=Quinault Department of Natural Resources, WDFW = Washington Department of Fisheries and Wildlife, ADFG=Alaska Department of Fish and Game, DIPC = Douglas Island Pink and Chum, MIC=Metlakatla Indian Community, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SSRA = Southern Southeast Regional Aquaculture Association.

[c] Rec = Number of fish recovered of noted tag code.

[d] Con = Estimated harvest (contribution) of the release of the noted tag code.

[e] Variance = Variance of the estimated harvest of the release of the noted tag code.

[f] Alaska wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds. Non-Alaskan wild stocks were only expanded by the sampling fraction.

Appendix B14.–Estimated contributions of hatchery-produced and wild tagged stocks to 591 chinook salmon sampled from the Petersburg marine boat sport fishery 3 May–11 July 1999.

Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
			HATCHERY STOCKS				
British Columbia	CDFO	Gillard Pass	18-13-52	1	1	0	0%
		B.C. total		1	1	0	0%
Washington	WDFW	Fallert Creek	63-60-58	1	3	5	1%
		Washington total		1	3	5	1%
Alaska	ADFG	Crystal Lake	04-01-02-1403	1	2	3	0%
			04-44-30	3	22	136	4%
			04-44-31	2	24	269	4%
			04-46-09	1	5	23	1%
			04-46-10	5	51	461	9%
			04-46-11	2	20	172	3%
		Crystal Lake/Earl West Cove	04-42-44	1	9	73	2%
		Crystal Lake/Neets Bay	04-42-43	1	11	108	2%
	NMFS	Little Port Walter	03-01-33	1	1	0	0%
			03-22-38	1	1	0	0%
			03-22-47	1	1	0	0%
			03-63-57	1	1	0	0%
	NSRA	Hidden Falls	04-43-24	1	10	84	2%
			04-47-11	2	21	202	4%
	SSRA	Carroll Inlet	04-44-20	1	10	88	2%
		Alaska total		24	189	1,619	32%
		TOTAL ALL REGIONS		26	193	1,624	33%
			WILD STOCKS[e]				
	ADFG	Unuk River	04-33-49	1	12	126	2%
		Wild Stock total		1	12	126	2%

Appendix B15.–Estimated contributions of hatchery-produced stocks to 284 chinook salmon sampled from the Wrangell marine boat sport fishery, 26 April-4 July 1999.

Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
British Columbia	CDFO	Quinsam River	18-18-30	1	8	59	3%
		BC total		1	8	59	3%
Alaska	ADFG	Crystal Lake/ Earl West Cove	04-42-44	1	11	101	4%
			04-44-32	2	17	121	6%
			04-45-36	1	13	150	5%
		Alaska total		4	41	372	14%
		TOTAL ALL REGIONS		5	49	431	17%

[a] CDFO = Canada Department of Fisheries and Oceans; WDFW = Washington Department of Fisheries and Wildlife, ADFG = Alaska Department of Fish and Game; NMFS = National Marine Fisheries Service; NSRA = Northern Southeast Regional Aquaculture Association,; SSRA = Southern Southeast Regional Aquaculture Association.

[b] Rec = Recovered number of fish of noted tag code from the sampled harvest.

[c] Con = Contribution to sampled harvest of the release of the noted tag code.

[d] Variance = Variance of the estimated contribution of the release of the noted tag code.

[e] Alaska wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B16.–Estimated contributions of hatchery-produced and wild tagged stocks to 1,315 chinook salmon sampled from the Craig/Klawock marine boat sport fishery, 26 April–12 September 1999.

Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
HATCHERY STOCKS							
British Columbia	CDFO	Conuma River	18-18-16	1	23	519	2%
		Kitimat River	18-14-33	1	9	79	1%
			18-14-34	1	8	63	1%
		Nitinat River	18-13-46	2	39	708	3%
			18-13-47	1	30	884	2%
			18-13-48	1	33	1,072	3%
			18-18-61	3	14	49	1%
		Quinsam River	18-16-48	1	8	58	1%
			18-20-20	1	8	61	1%
			18-20-21	1	8	64	1%
		Robertson Creek	18-06-34	2	15	98	1%
			18-14-57	1	45	2,024	3%
			18-22-20	1	1	0	0%
			18-22-23	1	1	0	0%
			18-22-31	1	1	0	0%
		San Juan River	18-13-34	1	13	167	1%
		Shuswap River	18-24-62	2	18	148	1%
		Snootli Creek	18-12-29	1	16	228	1%
			18-21-46	1	1	0	0%
			18-31-47	1	11	118	1%
		Tahsis PIP	18-18-24	1	4	9	0%
		Terrace	18-06-40	1	1	0	0%
			18-21-55	1	1	0	0%
			18-21-56	1	1	0	0%
		Tofino	18-22-51	3	3	0	0%
			18-33-55	1	2	1	0%
		B.C. total		33	314	6,350	24%
Idaho	WDFW	Lyons Ferry	63-63-21	1	1	0	0%
		Idaho total		1	1	0	0%
Oregon	ODFW	Gardiner Creek	07-05-34	1	1	0	0%
		Umtilla	09-17-48	1	2	2	0%
		Oregon total		2	3	2	0%
Washington	WDFW	Mixed Columbia	23-30-51	1	1	0	0%
			23-30-54	1	1	0	0%
		Carlton Rearing Pond	63-57-60	1	1	0	0%
		Klickitat	63-60-06	1	21	405	2%
			63-60-07	1	24	532	2%
		Makah on Sooes	05-40-48	1	5	18	0%
		Priest Rapids	63-57-11	1	32	1,020	2%
			63-60-01	1	26	665	2%
		Quinault Lake	21-30-42	1	2	3	0%
		Ringold Springs	05-01-02-0202	1	4	9	0%
		Washington total		10	117	2,652	9%
		Non-Alaska total		46	435	9,004	33%
Alaska	KTHC	Deer Mountain	04-43-15	1	5	20	0%
	NMFS	Little Port Walter	03-22-55	1	1	0	0%
	NSRA	Medvejie	04-45-39	1	17	257	1%
	SSRA	Carroll Inlet	04-40-50	1	11	115	1%
		Neets Bay	04-46-03	1	9	75	1%
		Alaska total		5	43	467	3%
		TOTAL ALL REGIONS		51	478	9,471	36%

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Region	Agency[a]	Hatchery/ release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
			WILD STOCKS[e]				
Alaska	ADFG	Unuk River	04-42-13	1	12	126	1%
		Wild Stock total		1	12	126	1%

[a] CDFO = Canada Department of Fisheries and Oceans, WDFW=Washington Department of Fisheries and Wildlife, ODFW = Oregon Department of Fish and Wildlife, KTHC = Ketchikan Tribal Hatchery Corporation, NMFS = National Marine Fisheries Service, NSRA = Northern Southeast Regional Aquaculture Association, SSRA = Southern Southeast Regional Aquaculture Association, ADFG = Alaska Department of Fish and Game.

[b] Rec = Recovered number of fish of noted tag code from the sampled harvest.

[c] Con = Contribution to sampled harvest of the release of the noted tag code.

[d] Variance = Variance of the estimated contribution of the release of the noted tag code.

[e] Alaska wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

Appendix B17.–Age composition of chinook salmon from selected Southeast Alaska sport fisheries, 1999.

Sport Fishery			BROOD YEAR 1997 0.1	1996 0.2	1996 1.1	1995 0.3	1995 1.2	1994 0.4	1994 1.3	1994 2.2	1993 0.5	1993 1.4	1993 2.3	1992 1.5	Sample Size
Ketchikan	Males	n					3	1	2			3			9
		Percent					33.3	11.1	22.2			33.3			
		SE[a]					16.7	11.1	14.7			16.7			
	Females	n					6		2					1	9
		Percent					66.7		22.2					11.1	
		SE[a]					16.7		14.7					11.1	
	Total[b]	n	1	9	11	18	151	12	52			63		2	319
		Percent	0.3	2.8	3.4	5.6	47.3	3.8	16.3			19.7		0.6	
		SE[a]	0.3	0.9	1.0	1.3	2.8	1.1	2.1			2.1		0.4	
Juneau	Males	n					26		48			26			100
		Percent					26.0		48.0			26.0			
		SE[a]					4.4		5.0			4.4			
	Females	n				1	7		41			25	2	2	78
		Percent				1.3	9.0		52.6			32.1	2.6	2.6	
		SE[a]				1.3	3.3		5.7			5.3	1.8	1.8	
	Total[b]	n		1		2	162	2	242	1		149	4	6	569
		Percent		0.2		0.4	28.5	0.4	42.5	0.2		26.2	0.7	1.1	
		SE[a]		0.2		0.2	1.9	0.2	2.1	0.2		1.8	0.4	0.4	
Juneau Derby	Total[b]	n					22		26			1			49
		Percent					44.9		53.1			2.0			
		SE[a]					7.2		7.2			2.0			
Petersburg	Total[b]	n				1	8	1	29		1	28		4	72
		Percent				1.4	11.1	1.4	40.3		1.4	38.9		5.6	
		SE[a]				1.4	3.7	1.4	5.8		1.4	5.8		2.7	
Wrangell	Total[b]	n		2		1	22	4	26			38			93
		Percent		2.2		1.1	23.7	4.3	28.0			40.9			
		SE[a]		1.5		1.1	4.4	2.1	4.7			5.1			
Craig/Klawock	Males	n		2		3		4	3			3			15
		Percent		13.3		20.0		26.7	20.0			20.0			
		SE[a]		9.1		10.7		11.8	10.7			10.7			
	Females	n				3	2	2	2						9
		Percent				33.3	22.2	22.2	22.2						
		SE[a]				16.7	14.7	14.7	14.7						
	Total[b]	n		5		24	2	27	10			15			83
		Percent		6.0		28.9	2.4	32.5	12.0			18.1			
		SE[a]		2.6		5.0	1.7	5.2	3.6			4.2			

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Sport Fishery			BROOD YEAR 1997	1996		1995		1994			1993			1992	Sample Size
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	
Sitka	Males	n				4		6	2			2			14
		Percent				28.6		42.9	14.3			14.3			
		SE[a]				12.5		13.7	9.7			9.7			
	Females	N				3	1	1	3			2			10
		Percent				30.0	10.0	10.0	30.0			20.0			
		SE[a]				15.3	10.0	10.0	15.3			13.3			
	Total[b]	N		6		207	30	196	162		5	120		3	729
		Percent		0.8		28.4	4.1	26.9	22.2		0.7	16.5		0.4	
		SE[a]		0.3		1.7	0.7	1.6	1.5		0.3	1.4		0.2	

[a] SE in percent.

[b] Includes sexed and unsexed chinook salmon.

Appendix B18.–Length-at-age in millimeters (from tip of snout to fork of tail) by sex for chinook salmon from selected Southeast Alaska sport fisheries, 1999.

Sport Fishery			BROOD YEAR 1997	1996		1995		1994			1993			1992	Sample Size
			0.1	0.2	1.1	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	1.5	
Ketchikan	Males	Mean					792	1,010	968			948			
		SE					34		13			4			
		n					3	1	2			3			9
	Females	Mean					755		843					920	
		SE					36		73						
		n					6		2					1	9
	Total[a]	Mean	440	726	511	863	769	937	881			984		1,070	
		SE		19	6	13	5	16	10			10		150	
		n	1	9	11	18	151	12	52			63		2	319
Juneau	Males	Mean					717		840			955			
		SE					12		11			16			
		n					26		48			26			100
	Females	Mean				845	736		826			863	855	1,030	
		SE					19		8			12	15	40	
		n				1	7		41			25	2	2	78
	Total[a]	Mean		700		835	709	1,003	823	810		907	824	1,003	
		SE				10	5	38	4			6	20	34	
		n		1		2	162	2	242	1		149	4	6	569
Juneau Derby	Total[a]	Mean					717		788			800			
		SE					9		11						
		n					22		26			1			49
Petersburg	Males	Mean				840	747		838		970	976		980	
		SE					18		13			18		20	
		n				1	3		11		1	11		2	29
	Females	Mean					775	980	848			919		985	
		SE					5		11			15		55	
		n					2	1	14			16		2	35
	Total[a]	Mean				840	733	980	840		970	940		983	
		SE					23		8			12		24	
		n				1	8	1	29		1	28		4	72

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Sport Fishery			BROOD YEAR 1997 0.1	1996 0.2	1996 1.1	1995 0.3	1995 1.2	1994 0.4	1994 1.3	1994 2.2	1993 0.5	1993 1.4	1993 2.3	1992 1.5	Sample Size
Wrangell	Males	Mean					790		832			928			
		SE					8		36			42			
		n					3		3			5			11
	Females	Mean				755	798		888			957			
		SE					28		21			19			
		n				1	4		5			7			17
	Total[a]	Mean		740		755	766	963	860			932			
		SE		20			12	88	10			14			
		n		2		1	22	4	26			38			93
Craig/Klawock	Males	Mean		828		858		944	817			983			
		SE		3		27		21	14			43			
		n		2		3		4	3			3			15
	Females	Mean				858	750	913	825						
		SE				35	30	23	0						
		n				3	2	2	2						9
	Total[a]	Mean		790		852	750	947	862			932			
		SE		16		8	30	12	18			22			
		n		5		24	2	27	10			15			83
Sitka	Males	Mean				778		989	855			905			
		SE				10		27	35			35			
		n				4		6	2			2			14
	Females	Mean				813	720	865	897			1,030			
		SE				7			23			0			
		n				3	1	1	3			2			10
	Total[a]	Mean		727		806	741	894	833		887	902		964	
		SE		17		4	7	5	4		24	7		43	
		n		6		207	30	196	162		5	120		3	729

[a] Includes sexed and unsexed chinook salmon.

Appendix B19.–Numbers of coho salmon examined for coded wire tags in Southeast Alaska marine boat sport fisheries in 1999.

Sport fishery	Seasonal period	Estimated harvest	Number sampled	Percent
Creel surveys				
Ketchikan[a]	4/26–8/01 non-derby	7,938	2,038	26
	Derby entered[b]	0	0	
	Derby not entered[b]	3	0	
	8/02–9/26	12,778	7,082	55
	Total	20,719	9,120	44
Juneau	4/26–8/01	8,023	2,219	28
	8/02–9/26 non-derby	14,257	3,639	26
	Derby entered[c]	2,851	2,038	71
	Derby take-home[c]	1,473	368	25
	Total	26,604	8,264	31
Sitka	4/26–8/01 non-derby	28,986	8,755	30
	Derby entered[d]	0	0	
	Derby take-home[d]	100	32	32
	8/02–9/26	44,671	11,190	25
	Total	73,757	19,977	27
	Creel survey totals	121,080	37,361	31
Catch sampling programs				
Petersburg	5/03-7/11		2	
Craig and Klawock	4/26–9/12		12,237	
	Total sampled		49,600	

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] Derby held 29–31 May, 5-6 June, and 12-13 June.

[c] Derby held 20–22 August.

[d] Derby held 29–31 May, and 5-6 June.

Appendix B20.–Estimates of hatchery-produced and wild tagged coho salmon contributed to the Ketchikan marine boat sport fishery, 26 April– 26 September 1999[a].

Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26–6/20			Non-derby 6/21–8/01			Non-derby 8/02–9/26			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
British Columbia	AFSP	Kitsumkalum	18-11-29				1	9	68				1	9	68
	CDFO	Fort Babine	18-24-10				1	4	14				1	4	14
			18-32-61				1	4	14	1	3	4	2	7	18
			18-32-62				1	6	28				1	6	28
		Hartley Bay	18-17-07							1	2	3	1	2	3
		Kitimat River	18-16-57				1	68	4,495	1	30	891	2	98	5,386
			18-24-46							2	28	379	2	28	379
		Snootli Creek	08-29-14							1	5	16	1	5	16
		Toboggan Creek	18-24-13				1	3	9				1	3	9
			18-24-15				1	5	18				1	5	18
			18-24-17				1	3	9	1	2	3	2	5	12
		B.C. total					8	102	4,771	7	70	1,341	15	172	6,112
Washington	LUMM	Skookum Creek	21-30-51				1	67	4,410				1	67	4,410
		Washington total					1	67	4,410				1	67	4,410
Alaska	KTHC	Deer Mountain	04-45-05				3	40	514				3	40	514
			04-45-07				4	55	746	1	7	36	5	62	782
			04-45-08				6	75	992				6	75	992
			04-47-41				15	212	3,857	2	15	101	17	227	3,958
			04-49-41				28	409	10,244				28	409	10,244
	MIC	Tamgas Creek	12-01-01-0206							1	103	10,457	1	103	10,457
			47-17-32							5	594	75,722	5	594	75,722
			47-17-33							4	165	7,113	4	165	7,113
			47-17-34							2	123	8,219	2	123	8,219
	SSRA	Burnett Inlet	04-48-10				1	30	900				1	30	900
		Earl West Cove	04-49-50							2	33	524	2	33	524
			04-49-51							1	19	333	1	19	333
		Nakat Inlet	04-49-56							2	44	889	2	44	889
			04-49-57							2	46	1,019	2	46	1,019
		Neets Bay	04-46-05							6	180	6,441	6	180	6,441
			04-46-06							13	644	41,484	13	644	41,484
			04-46-23							2	58	1,633	2	58	1,633
			04-49-43	1	233	54,273				9	397	28,144	10	630	82,417
			04-49-44							8	338	19,733	8	338	19,733
			04-49-45							8	332	17,731	8	332	17,731
			04-49-46							6	154	4,729	6	154	4,729
			04-49-47							6	232	9,842	6	232	9,842

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Region	Agency[b]	Hatchery/ release site	Tag code	Non-derby 4/26–6/20			Non-derby 6/21–8/01			Non-derby 8/02–9/26			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
Alaska	SSRA	Neets Bay	04-49-52				1	99	9,773	8	286	11,864	9	385	21,636
			04-49-53							5	179	6,944	5	179	6,944
			04-49-54				1	100	9,813	11	443	24,179	12	543	33,992
			04-49-55				1	73	5,245	4	155	6,819	5	228	12,064
		Whitman Lake	04-47-62				1	50	2,467				1	50	2,467
			04-49-48							11	244	6,662	11	244	6,662
			04-49-49				1	57	3,190	13	380	14,599	14	437	17,789
		Alaska total		1	233	54,273	62	1,200	82,727	132	5,171	1,195,339	195	6,604	1,332,339
		TOTAL ALL REGIONS		1	233	54,273	71	1,369	103,321	139	5,241	1,199,384	211	6,843	1,356,978
WILD STOCKS[e]															
British Columbia	AFSP	Zolzap Creek	28-16-21				1	4	12	2	4	5	3	8	17
	CDFR	Lachmach River	08-02-26							1	2	3	1	2	3
		B.C. total					1	4	12	3	6	8	4	10	20
Alaska	ADFG	Hugh Smith Lake	04-43-48							5	14	28	5	14	28
			04-43-50							2	5	11	2	5	11
		Naha River	04-46-45							2	37	883	2	37	883
			04-50-04							9	168	3,973	9	168	3,973
		Unuk River	04-47-16				1	171	28,954	13	1,139	136,659	14	1,310	165,614
		Alaska total					1	171	28,954	31	1,362	149,317	32	1,533	178,271
		WILD STOCK TOTAL					2	175	29,144	34	1,368	149,498	36	1,543	178,642

[a] Ketchikan estimates are biased low because a major access site (Clover Pass) was not sampled.

[b] AFSP = Aboriginal Fishery Strategy Program, CDFO = Canada Department of Fisheries and Oceans; LUMM = Lummi Tribe, KTHC = Ketchikan Tribal Hatchery Corporation; MIC = Metlakatla Indian Community; SSRA = Southern Southeast Regional Aquaculture Association, CDFR = Canada Department of Fisheries and Oceans - Research.

[c] Rec = Number of fish recovered of noted tag code.

[d] Con = Estimated harvest (contribution) of the release of the noted tag code.

[e] Variance = Variance of estimated harvest of the release of the noted tag code.

[f] Alaska wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds. Non-Alaskan wild stocks were only expanded by the sampling fraction.

Appendix B21.–Estimates of hatchery-produced and wild tagged coho salmon contributed to the Juneau marine boat sport fishery, 26 April–26 September 1999.

Region	Agency[b]	Release site	Tag code	Non-derby 6/21–8/01			Non-derby 8/02–9/26			Derby[a]			Total		
				Rec[c]	Con[d]	Variance[e]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
Alaska	DIPC	Gastineau	50-04-29	1	34	1,126	9	462	32,167	14	287	7,665	24	783	40,958
			50-04-30	1	34	1,142	8	394	24,213	8	161	4,014	17	589	29,369
			50-04-31	3	87	2,541	7	320	18,715	13	230	5,313	23	637	26,568
			50-04-32	1	29	832	10	443	29,788	9	123	1,560	20	595	32,180
			50-04-33	1	30	846	6	222	9,796	9	152	3,143	16	404	13,785
			50-04-34	1	30	874	9	301	14,105	8	141	3,065	18	472	18,043
			50-04-35	2	80	3,276	5	296	20,014	8	173	5,031	15	549	28,320
			50-04-36	2	60	1,790	8	290	13,362	11	183	3,608	21	533	18,760
	NSRA	Hidden Falls	04-48-55							1	36	1,280	1	36	1,280
			04-49-09				1	148	21,780	1	48	2,264	2	196	24,043
			04-49-10							1	21	429	1	21	429
			04-49-11	1	45	2,009	2	114	7,621	2	42	850	5	201	10,481
		Medvejie	04-01-03-1210				1	219	47,942	1	71	5,007	2	290	52,949
		Total		13	429	17,486	66	3,209	486,480	86	1,668	51,069	165	5,306	555,035
WILD STOCKS[f]															
Alaska	ADFG	Auke Creek	04-43-37	1	3	6	6	29	189	2	5	15	9	37	210
		Berners River	04-45-30				1	41	2,074	7	86	1,325	8	127	3,399
			04-46-49				2	81	4,148	1	14	221	3	95	4,369
		Dredge Lake	04-01-22							3	4	2	3	4	2
		Duck Creek	04-01-21				1	4	15				1	4	15
		Taku River	04-46-42	1	187	36,808	3	885	344,960	6	522	62,684	10	1,593	444,453
			04-46-43	1	187	36,808	4	1,180	459,947	5	435	52,237	10	1,801	548,992
		WILD STOCK TOTAL		3	377	73,645	17	2,220	827,840	24	1,066	116,495	44	3,661	1,017,980

[a] Derby held on 20–22 August 1999.

[b] DIPC = Douglas Island Pink and Chum; NSRA = Northern Southeast Regional Aquaculture Association; ADFG = Alaska Department of Fish and Game.

[c] Rec = Number of fish recovered of noted tag code.

[d] Con = Estimated harvest (contribution) of the release of the noted tag code.

[e] Variance = Variance of estimated harvest of the release of the noted tag code.

[f] Alaskan wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds. Dredge Lake and Duck Creek recoveries were only expanded by the sampling fraction.

Appendix B22.–Estimates of hatchery-produced and wild tagged coho salmon contributed to the Sitka marine boat sport fishery, 26 April–26 September 1999.

Region	Agency[a]	Release site	Tag code	Non-derby 4/26–6/20			Non-derby 6/21–8/01			Non-derby 8/02–9/26			Total		
				Rec[b]	Con[c]	Variance[d]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS															
British Columbia	AFSP	Kitsumkalum	18-11-29				1	8	51				1	8	51
			18-11-30				1	8	63	3	32	329	4	40	391
			18-11-31							1	8	64	1	8	64
	CDFO	Fort Babine	18-24-09							2	8	27	2	8	27
			18-24-10							1	5	21	1	5	21
			18-24-11				1	4	13				1	4	13
			18-32-61				1	5	19				1	5	19
			18-32-62				1	4	13				1	4	13
			18-32-63	1	7	40	2	8	24	2	8	28	5	23	91
		Hartley Bay	18-23-62				1	11	114				1	11	114
			18-23-63							1	11	115	1	11	115
			18-24-01				1	16	227	1	16	231	2	32	458
		Kitimat River	18-16-57				6	296	15,254	2	120	7,373	8	416	22,627
			18-24-46				4	90	1,974	1	26	667	5	116	2,641
		Nanaimo River	18-34-16							1	12	131	1	12	131
		Quinsam River	18-20-49							1	10	95	1	10	95
		Sewell Inlet PIP	18-23-60				1	4	10				1	4	10
			18-28-35				2	8	21				2	8	21
		Snootli Creek	08-29-14				1	7	41				1	7	41
		Toboggan Cr.	18-24-12				1	4	12	1	3	8	2	7	21
			18-24-14							1	3	8	1	3	8
			18-24-15				2	7	19				2	7	19
			18-24-16							1	4	14	1	4	14
			18-24-17				1	3	8	1	3	8	2	6	16
		B.C. Total		1	7	40	27	483	20,892	20	269	10,113	48	759	31,045
Alaska	ADFG	Crystal Lake	04-01-03 -0813				2	7	21				2	7	21
			04-47-25							1	15	203	1	15	203
	AKI	Port Armstrong	04-44-52				3	145	7,313	10	529	30,964	13	674	38,278
	DIPC	Gastineau	50-04-29							1	47	2,206	1	47	2,206
			50-04-34							1	42	1,713	1	42	1,713
			50-04-35				1	34	1,119				1	34	1,119
	KTHC	Deer Mountain	04-45-05				1	12	138				1	12	138
			04-45-07				2	21	215				2	21	215
			04-49-41	1	20	367	1	14	187				2	34	554
	MIC	Tamgas Creek	12-01-01 -0205							2	279	39,194	2	279	39,194
			47-17-32							6	1,323	314,536	6	1,323	314,536
			47-17-33							2	210	22,736	2	210	22,736

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Region	Agency[a]	Release site	Tag code	Non-derby 4/26–6/20			Non-derby 6/21–8/01			Non-derby 8/02–9/26			Total		
				Rec[b]	Con[c]	Variance[d]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
HATCHERY STOCKS (cont.)															
Alaska	MIC	Tamgas Creek	47-17-34							2	269	37,150	2	269	37,150
	NSRA	Hidden Falls	04-48-55				1	86	7,355	2	195	19,165	3	281	26,520
			04-49-11				1	50	2,475	2	126	8,157	3	176	10,632
		Medvejie	04-47-08				20	387	15,189	109	3,043	332,851	129	3,430	348,040
			04-49-23				2	7	19	23	102	578	25	109	597
		Medvejie CIF	04-01-03 -1210				8	1,340	267,412	11	2,175	515,986	19	3,515	783,398
			04-46-31							4	17	66	4	17	66
	PWHA	Klawock River	50-31-32							2	108	5,773	2	108	5,773
		Sheldon													
	SJ	Jackson	04-01-18				4	38	390	11	146	2,388	15	184	2,778
	SSRA	Burnett Inlet	04-48-10				2	70	2,418				2	70	2,418
		Earl West Cove	04-49-50				1	32	975	3	104	3,604	4	136	4,580
			04-49-51				2	61	1,850	5	179	6,675	7	240	8,525
		Nakat Inlet	04-49-56				2	71	2,718	5	206	8,883	7	277	11,601
			04-49-57				2	68	2,241	4	201	11,541	6	269	13,781
		Neets Bay	04-46-05				3	171	9,723	3	180	11,056	6	351	20,780
			04-46-06				4	362	42,697	4	533	80,371	8	895	123,068
			04-46-23							1	56	3,064	1	56	3,064
			04-49-43				3	220	16,389	5	625	100,750	8	845	117,139
			04-49-44				3	216	15,767	2	193	19,130	5	409	34,897
			04-49-45				5	380	36,098	7	605	56,825	12	985	92,923
			04-49-46				1	43	1,804	3	167	9,502	4	210	11,306
			04-49-47				3	230	21,159	3	336	44,953	6	566	66,112
			04-49-52				2	168	14,084	6	478	40,812	8	646	54,896
			04-49-53				1	70	4,880	1	88	7,740	2	158	12,619
			04-49-54				1	70	4,889	3	248	21,090	4	318	25,980
			04-49-55				3	211	17,729	4	336	29,919	7	547	47,648
		Whitman Lake	04-01-03 -1101				1	112	12,396				1	112	12,396
			04-01-03 -1104				1	112	12,370				1	112	12,370
			04-01-03 -1215				1	112	12,373				1	112	12,373
			04-49-48				4	171	8,335	6	345	22,804	10	516	31,140
			04-49-49				2	105	5,391	5	291	17,969	7	396	23,359
	Alaska Total			1	20	367	93	5,196	1,504,168	259	13,797	4,539,114	353	19,013	6,043,649
	TOTAL ALL REGIONS			2	27	419	120	5,679	1,661,383	279	14,066	4,672,129	401	19,772	6,333,931

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				WILD STOCKS[e]											
				Non-derby 4/26–6/20			Non-derby 6/21–8/01			Non-derby 8/02–9/26			Total		
Region	Agency[a]	Release site	Tag code	Rec[b]	Con[c]	Variance[d]	Rec	Con	Variance	Rec	Con	Variance	Rec	Con	Variance
British Columbia	AFSP	Zolzap Creek	28-16-21				1	3	9	1	4	11	2	7	20
	CDFR	Lachmach R.	08-02-26				1	3	7				1	3	7
			08-02-30				1	4	12	1	8	56	2	12	68
			08-17-51				2	7	22				2	7	22
		B.C. total					5	17	54	2	12	67	7	29	121
Alaska	ADFG	Auke Creek	04-43-37							1	4	14	1	4	14
		Berners River	04-45-30	1	39	1,500							1	39	1,500
		Ford Arm Lake	04-46-53				4	145	5,490	6	299	17,084	10	443	22,574
		Hugh Smith L.	04-43-48				5	26	163	7	56	583	12	82	746
			04-43-50				3	16	98	1	8	83	4	24	181
		Naha River	04-46-45							3	101	4,309	3	101	4,309
			04-50-04				1	33	1,088	2	68	2,873	3	101	3,961
			04-46-29				1	33	1,089	1	34	1,110	2	67	2,199
		Nakwasina R.	04-46-30				1	30	891				1	30	891
		Taku River	04-46-42							1	260	67,317	1	260	67,317
			04-46-43	1	308	94,814				1	209	43,368	2	517	137,936
		Unuk River	04-47-16				2	393	81,249	4	705	137,663	6	1,098	218,912
		Alaska total		2	347	96,314	17	676	92,552	27	1,744	307,489	46	2,767	496,355
		WILD STOCK TOTAL		2	347	96,314	22	693	92,776	29	1,756	308,129	53	2,796	497,219

[a] AFSP = Aboriginal Fishery Strategy Program, CDFO = Canada Department of Fisheries and Oceans, ADFG = Alaska Department of Fish and Game, AKI = Armstrong-Keta, Inc., DIPC = Douglas Island Pink and Chum, Inc., KTHC = Ketchikan Tribal Hatchery Corporation, MIC = Metlakatla Indian Community, NSRA = Northern Southeast Regional Aquaculture Association, PWHA = Prince of Wales Hatchery Association, SJ = Sheldon Jackson College, SSRA = Southern Southeast Regional Aquaculture Association, CDFR = Canada Department of Fisheries and Oceans - Research.

[b] Rec = Number of fish recovered of noted tag code.

[c] Con = Estimated harvest (contribution) of the release of the noted tag code.

[d] Variance = Variance of estimated harvest of the release of the noted tag code.

[e] Alaskan wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds. Non-Alaskan wild stocks were only expanded by the sampling fraction.

Appendix B23.–Estimated contributions of hatchery-produced and wild tagged stocks to 12,237 coho salmon sampled from the Craig/Klawock marine boat sport fishery, 26 April-12 September 1999.

Region	Agency[a]	Hatchery/release site	Tag code	Rec[b]	Con[c]	Variance[d]	Relative contribution
HATCHERY STOCKS							
British Columbia	CDFO	Bella Bella	18-24-18	2	6	11	0%
		Fort Babine	18-24-09	3	4	1	0%
		Hartley Bay	18-23-63	1	3	8	0%
		Kitimat River	18-16-57	1	14	188	0%
			18-24-46	1	6	33	0%
		Quinsam River	18-20-49	1	2	3	0%
		B.C. total		9	35	244	0%
Alaska	ADFG	Crystal Lake	04-01-03-0513	1	1	0	0%
	KTHC	Deer Mountain	04-45-05	1	3	6	0%
			04-45-08	1	3	7	0%
			04-47-41	1	3	8	0%
	MIC	Tamgas Creek	47-17-33	1	25	596	0%
	NSRA	Hidden Falls	04-49-11	1	15	209	0%
	PWHA	Klawock River	50-31-25	8	95	1,038	1%
			50-31-26	18	189	1,791	2%
			50-31-32	17	241	3,170	2%
	SSRA	Burnett Inlet	04-48-11	1	9	68	0%
		Earl West Cove	04-49-51	1	10	83	0%
		Nakat Inlet	04-49-57	2	21	204	0%
		Neets Bay	04-46-05	1	16	254	0%
			04-46-06	1	27	700	0%
			04-49-43	1	23	520	0%
			04-49-47	1	23	500	0%
			04-49-54	1	21	419	0%
			04-49-55	1	21	418	0%
		Whitman Lake	04-49-48	3	39	469	0%
		Alaska total		62	785	10,460	6%
		TOTAL ALL REGIONS		71	820	10,704	7%
WILD STOCKS[e]							
British Columbia	CDFR	Lachmach River	08-02-26	1	1	0	
		B.C. total		1	1	0	
Alaska	ADFG	Hugh Smith Lake	04-43-48	3	4	2	
		Naha River	04-46-45	1	3	27	
		Naha River	04-50-04	1	17	161	
		Alaska total		5	24	190	
			WILD STOCK TOTAL	6	25	190	

[a] CDFO = Canada Department of Fisheries and Oceans, ADFG = Alaska Department of Fish and Game, KTHC = Ketchikan Tribal Hatchery Corporation, MIC = Metlakatla Indian Community, NSRA = Northern Southeast Regional Aquaculture Association, PWHA = Prince of Wales Hatchery Association, SSRA = Southern Southeast Regional Aquaculture Association, CDFR = Canada Department of Fisheries and Oceans-Research.

[b] Rec = Recovered number of fish of noted tag code from the sampled harvest.

[c] Con = Contribution to the sampled harvest of the release of the noted tag code.

[d] Variance = Variance of the estimated contribution of the release of the noted tag code.

[e] Alaska wild stock contribution estimates were expanded by using tagging fractions estimated from the ratio of marked to total adults on the spawning grounds.

APPENDIX C: DATA FILES

Appendix C1.–Computer data files and analysis programs developed for the 1999 Southeast Alaska marine boat sport fishery survey. Data files (*.DTA) archived at Alaska Department of Fish and Game, Division of Sport Fish, Policy and Technical Services Unit, 333 Raspberry Rd., Anchorage, AK 99518-1599.

Effort, Catch, and Harvest Estimation Files (in KMC99EST.ZIP, JMC99EST.ZIP, PMC99SAM.ZIP, SMC99EST.ZIP, WMC99SAM.ZIP, CMC99SAM.ZIP, and KLAWOCK99.ZIP)	
A0811999.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Ketchikan, 1999
B7521999.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Klawock, 1999
B7601999.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Craig, 1999
C0821999.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Petersburg, 1999
C0811999.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Wrangell, 1999
C99SIM.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Sitka, 1999
C99JNM.DTA	Data file (ASCII) containing interview information recorded on mark-sense interview forms (MARINE INTERVIEW VERSION 1.0) recorded at Juneau, 1999
aMS99.SAS	SAS programs to create basic interview SAS save files from mark-sense data files. 'a' stands for the letter of each site respectively: K for Ketchikan, P for Petersburg, W for Wrangell, S for Sitka, J for Juneau, C for Craig.
aMC99ESS.SAS	SAS programs to create revised interview SAS save files from files created by aMS99.SAS. Revised files have stratification information added to them, have non fin-fish (i.e., shellfish) data removed, and/or have multi-line interviews collapsed to one record per interview. See above for explanation of 'a'.
aMC99MSM.SAS	SAS programs to create SAS save files with only the sampling information associated with each sample for each survey from files created by aMC99ESS.SAS. See above for explanation of 'a'
aMC99EST.SAS	SAS programs to estimate effort, catch, and harvest with associated variances using SAS save files created by aMC99ESS.SAS and aMC99MSM.SAS. Program operates on one species at a time as determined by inputs in temporary input data file 'SPECLIST.DAT'. See above for explanation of 'a'
Coded Wire Tag Contribution Estimation Files (in CWT99.ZIP)	
SPRT_EXPNS.XLS	Data file from tag lab with sampling information for each biweekly period at each fishery.
SFCON99.XLS	Data file from tag lab with recovery information for each adipose finclipped coho and chinook salmon sampled.
SEN99CWT.SAS	SAS program to do basic estimates.
SEN99CO1.SAS	SAS program to summarize contributions across tag codes for main tables.
SEN99CWP.SAS	SAS program to list tags, contributions, and variances for appendices.
Age-weight-length (AWL) Files (in CHI99AWL.ZIP and HAL99AWL.ZIP)	
CHIN99ALL.DTA	Data file (ASCII) containing chinook salmon AWL data from all sample sites (this file was converted to CHIN99ALL.XLS for input to the SAS program).
REG_LF99CHI.SAS	SAS program to summarize chinook salmon AWL data
HAL99ALL.XLS	Data file (ASCII) containing halibut AWL data from all sample sites (this file was converted to HAL99ALL.XLS for input to the SAS program).
L99HAL.SAS	SAS program to summarize halibut AWL data